AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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LION PAW BELTING

TRADE MARK

This booklet contains belting data—comparative tests, charts and other information interesting and valuable to the man responsible for belting economy. A copy will be sent free at your request. Write for it today

Cuts the Unreckoned Costs

Lion Paw, the solid interwoven belt is permanently lubricated and waterproof.

Years of service in some of the country's largest textile mills have proved that Lion Paw eliminates many of the frequently *Unreckoned* Costs—belt maintenance charges.

Lion Paw also has a low initial cost and gives efficient service throughout its long life.

It runs without dressing—It retains its grip
It cannot become hard or crack

Mfg. by Buckner Process Co., Inc.

R.D. Skinner & Co. Inc.
70 East 45th St., New York City
70 State St. Boston, Mass.

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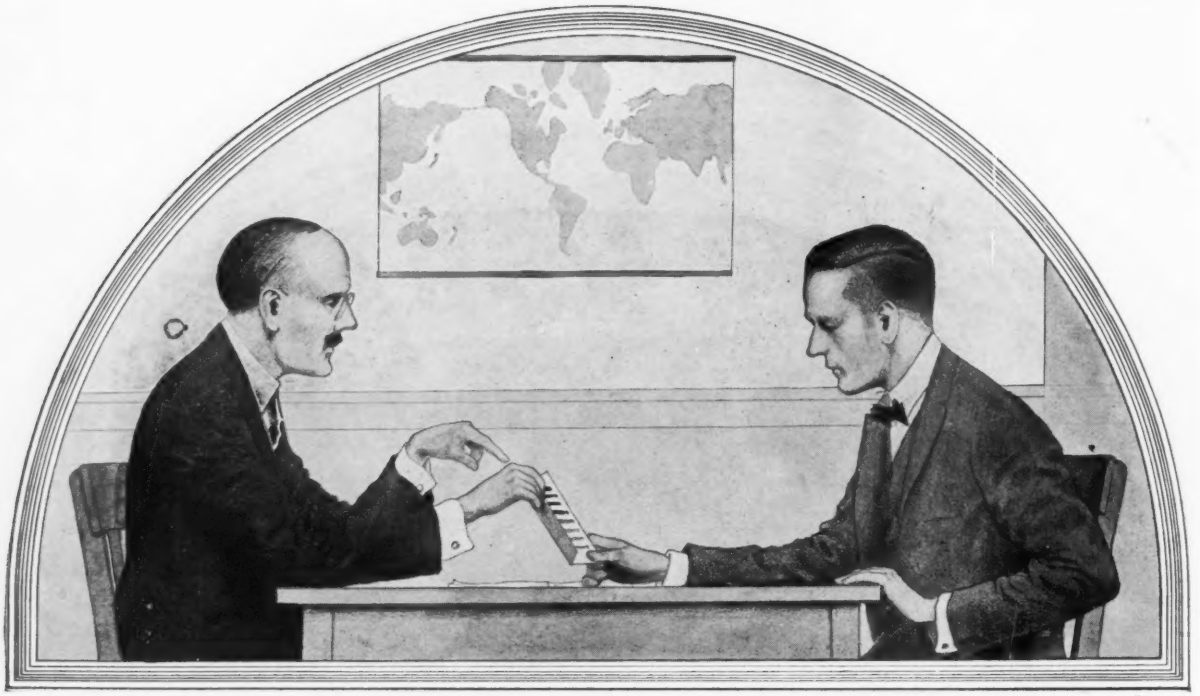
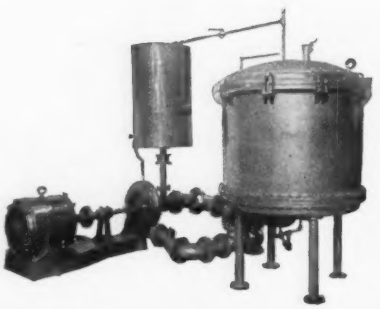


"Do You Use Franklin Dyed Yarn?"

It is a question that converters are asking of manufacturers' representatives. What is the significance of this question?

It means that through sheer merit Franklin Package Dyeing has demonstrated to converters its superiority over raw stock or warp dyeing. Franklin colors are more brilliant, more solid, better penetrated and absolutely fast.



A FRANKLIN PACKAGE DYEING MACHINE

Converters realize the value of these superior qualities as selling points. Consequently they not only inquire as to the dyeing process used on goods which they buy, but they actually specify Franklin colors in many cases. Many Franklin colors cannot be equalled by any other process.

Why wait for converters to ask if your goods are Franklin dyed. Why wait for them to specify Franklin dyed yarns? Why not take the initiative and make use of Franklin Package Dyeing in your selling talk? Franklin dyeing is of real value to you, because experience has demonstrated its superiority to the trade.

We will be glad to discuss with you the matter of handling your dyeing on a contract basis. We have three dye houses fully equipped with Franklin Machines—one in Providence, another in Philadelphia and a new one in Greenville, South Carolina. We are doing work for many of the largest manufacturers. Just drop us a line and we'll have a representative call or will tell our story by mail, whichever you prefer.

FRANKLIN PROCESS

Philadelphia CO. Manchester, Eng.

New Plant in Greenville, S. C.

PROVIDENCE, RHODE ISLAND, U.S.A.

Job Dye Houses in All Four Cities

No. 40

NORTHROP

TRADE-MARK REG U S PAT OFF

LOOMS

ON COTTON GOODS AND MOST WORSTEDS

THAT CAN BE WOVEN WITH ONE

SHUTTLE SAVE 50 TO 75 PER CENT

OF THE LABOR COST OF WEAVING

AND

PRODUCE BETTER GOODS

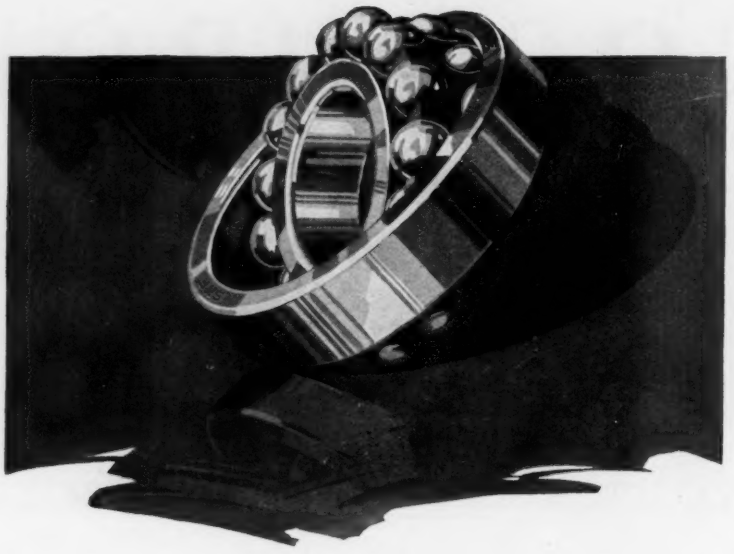
DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

SKF



Wherever Misalignment is a Factor

THE operation of your machine will not be successful unless its bearings function in complete harmony with other parts. Deflections in the shaft, weaving in the frame and other causes may create severe stresses in all parts of the bearing, unless the latter has some inherent means to compensate for this misalignment.

The **SKF** marked self-aligning bearing operates on the same principle as the ball and socket joint and is therefore capable of taking care of the severest misalignment. Moreover the aligning action is positive, immediate and automatic.

The self-aligning bearing is a product of the Skayef Ball Bearing Company and is sponsored by the **SKF** Industries Inc. Its manufacture embodies all the minute care, precision and quality for which the mark **SKF** stands. The world-wide experience of this organization is put at your disposal, free of any obligation on your part.

THE SKAYEF BALL BEARING COMPANY

Supervised by SKF INDUSTRIES INC., 165 Broadway, New York City

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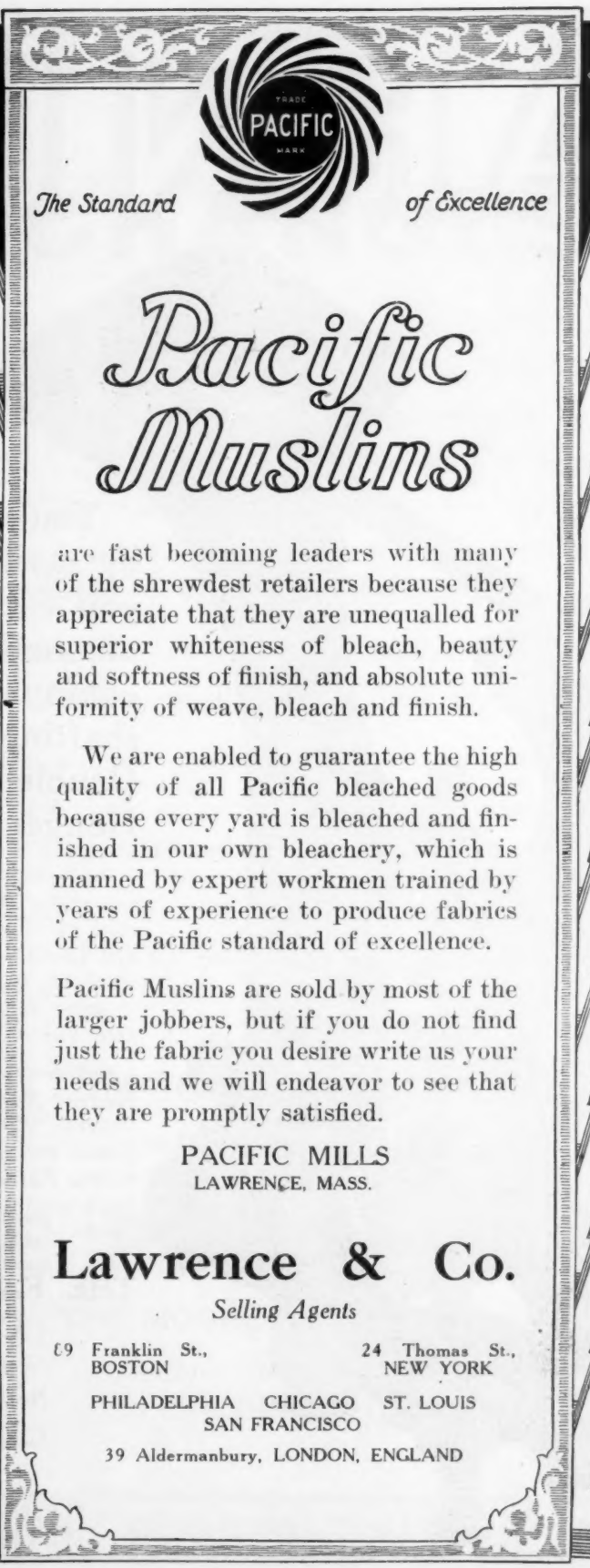


The Standard of Excellence

Pacific Muslins

are fast becoming leaders with many of the shrewdest retailers because they appreciate that they are unequalled for superior whiteness of bleach, beauty and softness of finish, and absolute uniformity of weave, bleach and finish.

We are enabled to guarantee the high quality of all Pacific bleached goods because every yard is bleached and finished in our own bleachery, which is manned by expert workmen trained by years of experience to produce fabrics of the Pacific standard of excellence.

Pacific Muslins are sold by most of the larger jobbers, but if you do not find just the fabric you desire write us your needs and we will endeavor to see that they are promptly satisfied.

PACIFIC MILLS
LAWRENCE, MASS.

Lawrence & Co.

Selling Agents

69 Franklin St., BOSTON
24 Thomas St., NEW YORK

PHILADELPHIA CHICAGO ST. LOUIS
SAN FRANCISCO

39 Aldermanbury, LONDON, ENGLAND

FAFNIR

You can save money by saving power, and you can save a vast amount of power by equipping your line shafting with Fafnir Double Ball Bearing Hanger Boxes.

Each box contains ***two*** Fafnir Ball Bearings. The balls run in hardened steel races with virtually no wear, and adjustments will never be needed. Aside from applying grease once in six to eight months, you can forget your Fafnir equipment.

Fafnir Double Ball Bearing Hanger Boxes fit your present frames. With the problem thus simplified, every day that you put off ordering ***Fafnir Boxes*** for your shafting is another day of needless power waste.

THE FAFNIR BEARING COMPANY

Conrad Patent Licensee

New Britain, Conn.

Southern Representative,

O. R. S. POOL,

P. O. Box 1375, Greenville, S. C.

CHANGES

Two and one-half years ago, the entire capital stock of The Moore Oil Company was purchased by The Ohio Cities Gas Co. The name of our organization was then changed to The Moore Oil Refining Co. Some time after this change in name was made, our Parent Organization came out under a new title—THE PURE OIL CO.—a name more suited to the activities of the group of interests operated by The Ohio Cities Gas Co.

Since that time the various subsidiaries have changed their names and have become **divisions** of THE PURE OIL CO.

The sales policies, products and services of the various divisions have undergone no pronounced change except to enjoy the advantages of greatly enlarged facilities.

THE TEXTILE OIL DEPARTMENT of THE MOORE OIL REFINING CO. DIVISION OFFERS THE BEST VALUES IN DEPENDABLE

COTTON SOFTENERS, EMULSIONS and TEXTILE OILS

THE PURE OIL CO.

THE MOORE OIL REFINING CO.
Division
CINCINNATI, OHIO.

The Moore Oil Refining Co. Cincinnati, O.

EFFICIENT LIGHTING INSTALLATIONS

H. & G. Service Means Economy and Satisfaction

The Difference

Every textile manufacturer of course knows the advantages of good lighting over bad lighting and why it increases production, decreases spoilage and defective work, prevents accidents, and increases cleanliness and morale.

H. & G. Service means that when you desire an efficient lighting system for your mill, your problems can be turned over to us with the knowledge that not only the most efficient and scientific lighting arrangement will be used, but that the actual work will be done right, in the least time, and at the greatest saving to you that can be effected.

Our years of experience with textile mill illuminating fits us to serve you efficiently. Our selection of materials, lights, switches, connections, reflectors, etc., are made with your interests and economy in mind, and with safety and permanence in view.

Your interests are ours—we must uphold our reputation by assuring your satisfaction, initially and permanently. Let H. & G. Service be called in on your next electrical installation, lighting, power, wiring, or whatever it may be.

HUNTINGTON & GUERRY, INC., GREENVILLE, S. C.

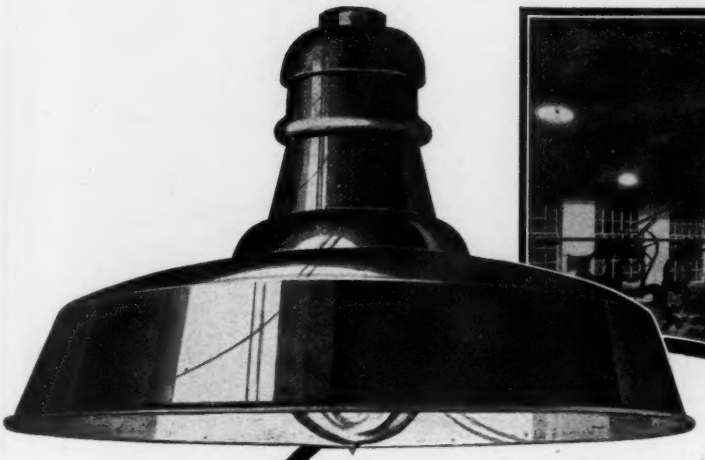
HUNTINGTON & GUERRY TROUBLE PROOF ELECTRICAL INSTALLATIONS

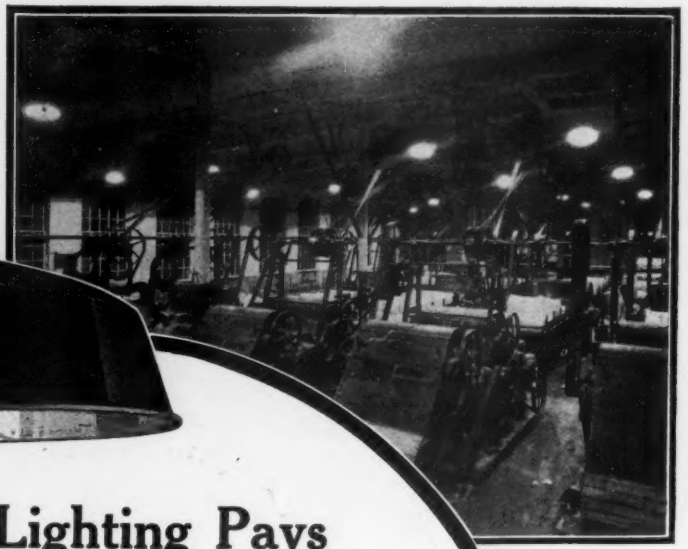
H. & G.

"TROUBLE-PROOF" ELECTRICAL INSTALLATIONS

Westinghouse-Cutter

Lighting Equipment for Textile Mills





Carding Room in a Cotton Mill with Westinghouse-Cutter Reflectors.

Good Lighting Pays

To secure the greatest production textile mills must have the best illumination.

A marked increase in production, in many cases 15% and more, invariably follows when poor lighting is superseded by good lighting—increased production, in every case, paying handsome dividends on the initial cost of installing modern lighting equipment. In fact, it costs less to have good lighting than poor lighting.

Good lighting impels operatives to work with greater speed and accuracy, as bright surroundings make them more alert and enable them to see better. The liability to accidents is also greatly lessened.

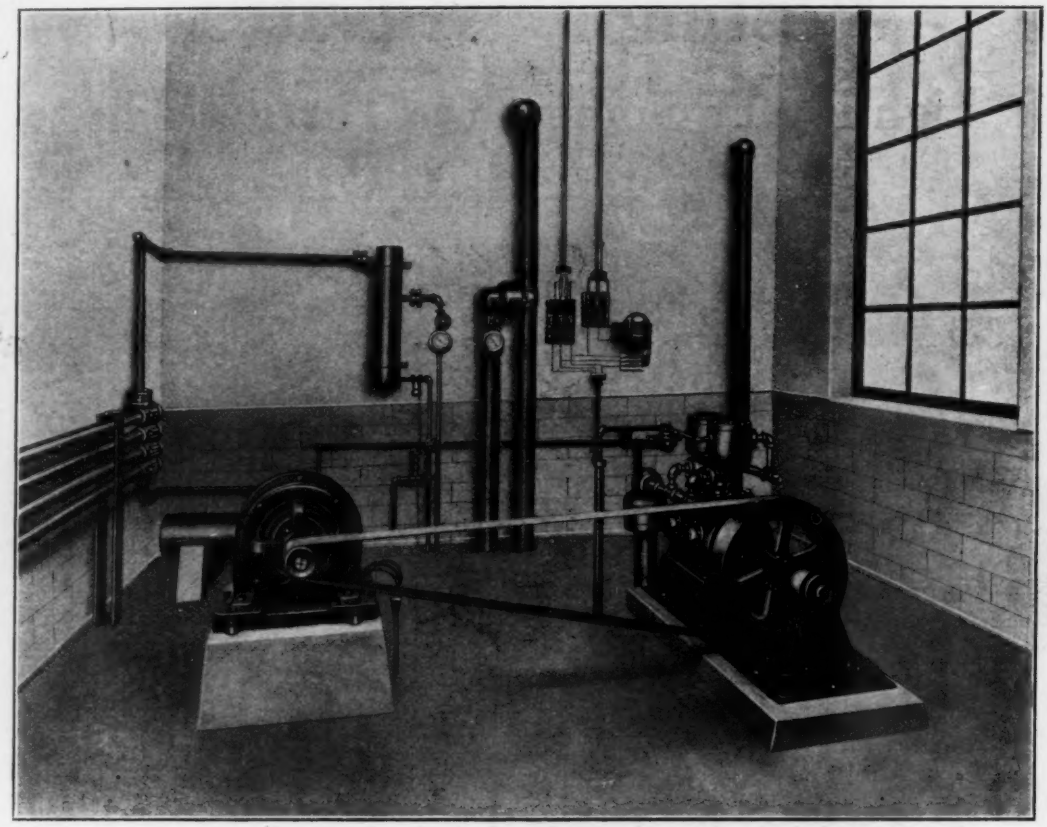
Westinghouse Illuminating Engineers stand ready to make a preliminary survey of your plant without cost or obligation, and show just what better lighting will save and produce. Their estimates, while conservative, are generally surprising.

Westinghouse Electric & Mfg. Co.

George Cutter Works, South Bend Indiana

W
WESTINGHOUSE ELECTRIC

Westinghouse



Three Ton Refrigerating Plant Installed For C. P. Austin, Charlotte, N. C.

Southern

IMPROVED

ICE AND REFRIGERATING MACHINES

In The SOUTH

In the illustration pictured above, we show a typical installation of one of our three-ton refrigerating plants, installed for C. P. Austin, of Charlotte, N. C.

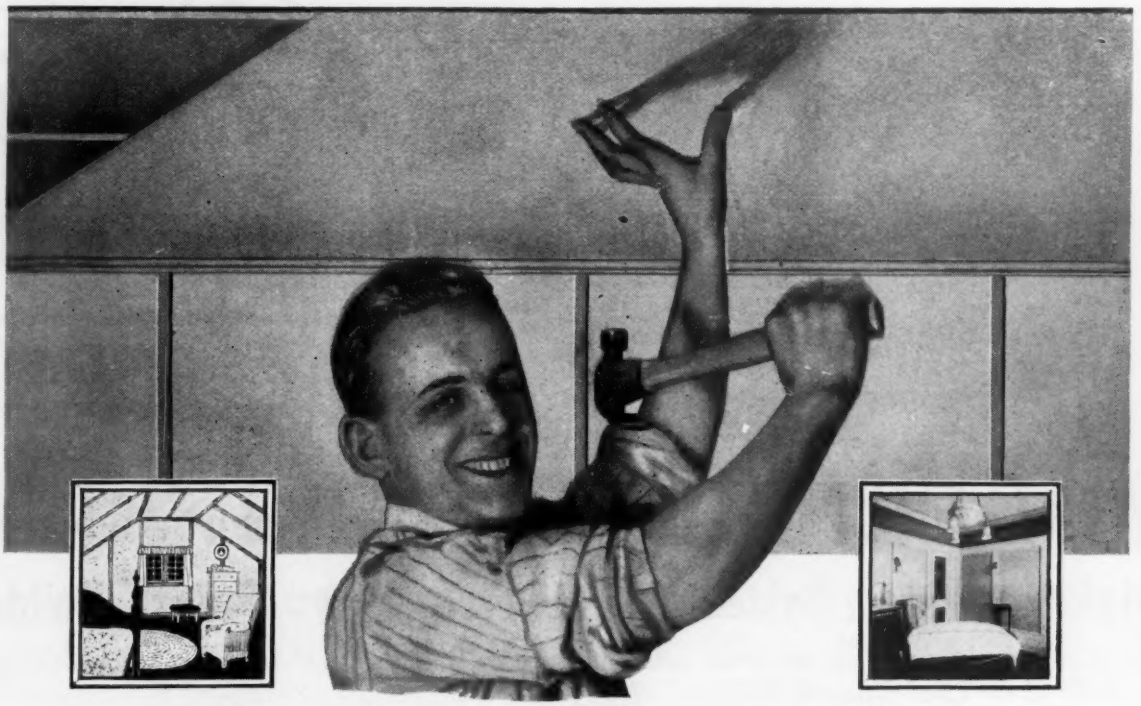
This three-ton refrigerating plant does the work of THREE TONS of ice, at far below what the cost of purchasing ice would be.

The superior construction throughout of the "SOUTHERN" insures its lasting qualities and the machines last for more than 20 years and the cost for repairs and operation are negligible in comparison with the cost of ice.

We are prepared to submit detailed drawings for your individual needs.

Write for information.

SOUTHERN ICE MACHINE CO., Charlotte, N. C.



No other wallboard like "Triple-Sized" Cornell for Mill Housing

THE reasons for selecting Cornell-Wood-Board for Mill Home construction (instead of lath and plasfer or ordinary wallboard) are extremely important if you want beautiful interiors that will last indefinitely and *cost less put up* than lath and plaster or plaster board.

Our "Triple-Sizing" process gives Cornell triple the protection of ordinary wallboard against warping, buckling, sound and variation in temperature and humidity; and makes Cornell extra strong and rigid.

Cornell

Takes the Place of Lath and Plaster for Walls, Ceilings and Partitions

Wood Board

Eight Lengths, 6 to 16 feet—two widths, "Cornell 32" and "Cornell 48"

No wallpaper is needed with Cornell Panels because this pure wood fibre board comes already primed for painting—thus saves much work and expense.

Cornell's fashionable "Oatmeal Finish" has introduced a beauty unknown in wallboard before, rivalling costly wallpaper.

Write, or attach the coupon to your letterhead and mail to us for quotations in carloads or less than carload, sample board, color book of finished interiors No. 82-A and our proposition to supply blue print designs for Cornell interior construction without cost.

CORNELL WOOD PRODUCTS CO.,
GENERAL OFFICES: 190 N. STATE STREET, CHICAGO, ILL.
Distributors Located throughout the United States
Water Power Mills and Timber Lands in Wisconsin.

Mail This
attached to your letterhead.
Cornell Wood Products Co.,
General Offices, 190 N. State St.
Chicago, Ill.
Quote us prices on Cornell Board in ..... quantities and mail your free book of finished interiors, sample board and proposition for supplying Cornell interior plans without cost.

Name .....
Address .....
City ..... State .....

MODERNIZE---Install A Lipman Automatic Drinking Water System. The Five Way Profit Builder

You will wonder how you ever got along with the make-shift Refrigeration of Ice or the trouble and uncertain results of the Hand Operated Machines, once you install a Lipman Full-Automatic Refrigerating Machine. For a Lipman is a PROFIT BUILDER!

—it eliminates the unsanitary features of the old-icing method—thereby guarding the health of your employees.

—it supplies cool, palatable drinking water at a constant, unvarying temperature thereby materially increasing the efficiency of the workers.

—the drinking water fountains are located near the workers—so saves time for production.

—it operates at only a fraction of the cost of ice.

—it eliminates the overhead expense of the icing method—or the need of an attendant with the hand operated machines.

THE LIPMAN AUTOMATIC IS DESIGNED so as to be installed as separate units; the capacity of each unit is listed below. By these means we are in position to make the largest of installations desired, as well as the smaller—saving the enormous expense of one tremendous central unit supplying all your workers and, at the same time, guaranteeing to you a constant supply of cool drinking water at much lower operating, as well as initial cost. These figures are based on supply water at 85° being cooled to 50° on 12 hour operation —taking into consideration the excessive requirements of the Textile Industry, Steel Plants, Foundries, etc. The requirements of Office Buildings, Hotels,Light Manufacturing Plants, etc., being so much less, a greater number of people can be supplied in proportion.

Machine Model	H.P. Motor	Machine R.P.M.	Dimesions Length	Width	Height	Water Cooling Capacity	Allowing 2 gal. per day per man	
700	1	350	36"	22"	58"	500 Gal.	250	EMPLOYEE
1400	2	350	37"	31"	61"	1000 Gal.	500	"
2800	3	350	67"	20"	58"	2000 Gal.	1000	"
5000	7½	350	60"	30"	60"	5000 Gal.	2500	"

Miles Refrigerating Company

man

REFRIGERATION

DRINKING WATER---At A Uniform Temperature----Absolutely Essential

As experience has shown that water at from 45° to 50° is the most acceptable, the Lipman Automatic Drinking Water System is so designed as to provide for a temperature rise of not more than 4° with the water leaving the cooling tank at 45°. Not only will this be found to be economical from the standpoint of operation, but it will also insure the delivery of water of approximately the same temperature at all points in the plant.

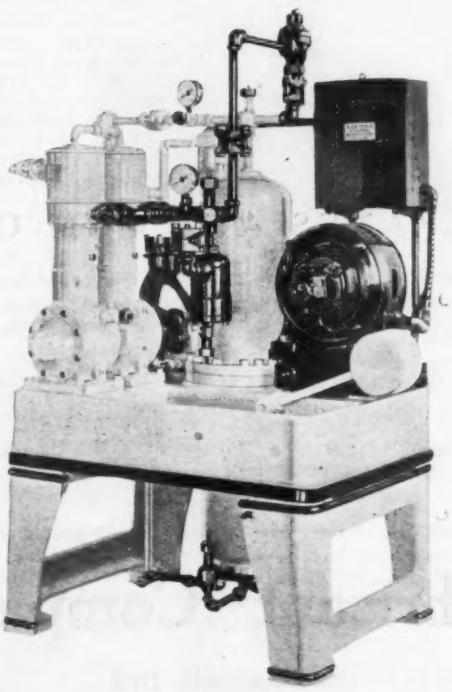
The necessity of drinking water at a uniform temperature can not be stressed too much as the old methods with the attendant trouble originating from drinking water at an improper temperature have proven very costly as demonstrated by hundreds of plants throughout the country. The Lipman Automatic Drinking Water System insures you against all these bad features and is a profit builder from the start.

Wonderfully Efficient

An efficient Refrigeration Plant is necessarily one which maintains an absolutely uniform temperature with the lowest possible cost. This can only be done by eliminating the human element and making it arbitrarily automatic.

The Lipman Line of Refrigerating Machines were originated as Automatic. They never were in any way ordinary machines with automatic attachments added. Every part was designed solely to operate and function automatically, to give long and satisfactory service, and to give maximum efficiency at a minimum cost of operation and maintenance.

It is impossible to obtain maximum efficiency from an old style hand operated machine with automatic attachments added.



Distinctively Modern

Lipman Machines occupy only a fraction of the space required by the old style refrigerating equipment. The arrangement of mounting the compressor, condenser, motor and control devices upon a single rigid base, makes a very compact unit and also eliminates the troubles from leaky joints caused by vibration in the old style scattered arrangement of the various units.

The Lipman Machines require no attention other than occasional oiling. A thermostat starts and stops the machine and eliminates all hand control. Hand Operated machines with their many valves, require operation or regulation several times daily.

Cost of Operation

An idea of the great saving to be made may be had by comparing the cost of supplying approximately 450 workers with Iced Water under your present system and the cost of operating a 2 H.P. Motor at your Power Rates. Our Model No. 1400 Unit is operated with a 2 H.P. Motor and will supply a constant amount of cool, palatable Drinking Water at a steady unvarying Temperature.

292 Peachtree Street, Atlanta, Ga.

"Clings to Metal"

A WELL KNOWN MILL MAN ONCE SAID: "When I was a kid the only way they could get me to take a capsule was to hide it in a spoonful of apple jelly. But when I swallowed the jelly, I always felt the capsule."

Most lubricants sold to cotton mills are covered with jelly, too. They are very light in color and are represented to be stainless. THE COLOR IS THE JELLY. The result is the capsule.

There is no oil or grease with the proper lubricating value that will not stain. The lighter its color, the dirtier and darker it gets when in use and in contact with metal. Frequently the lighter its color, the lighter its lubricating value, the less its heat and friction resisting qualities.

To cling to metal, an oil must have body. To have body it must be a NATURAL OIL, an oil of the same undisturbed elements as Nature produced it for lubricating purposes, not an oil that has been bleached and diluted with artificial fillers and binders to make it look harmless.

D-A LUBRICANT IS PURELY A DENSIFIED, MINERAL OIL

It is made by taking the finest grade of Pennsylvania parafine base refined oil and treating it by our special process. The process is entirely a cold one. The lubricating properties of the oil are CONCENTRATED. Its clinging qualities to metal are intensified. Its resistance to heat, caused by friction or direct contact, is increased 400%.

While its color is dark, it is absolutely pure and harmless. Harmless because it clings to metal, will not stain yarn or cloth, because when properly applied it will not thin down and throw off. When in actual use and in contact with metal, its color lightens almost to that of a light cylinder oil. THIS IS BECAUSE IT IS PURE. It has no fillers or binders or acids frequently used to disguise the staining properties of oil.

IT NEVER LEAVES ANY GUM OR RESIDUE

IT IS ECONOMICAL, because:

It keeps gears, cams and bearings clean and oily.

It lessens power consumption.

Its life is 6 to 8 times longer than any other cotton mill lubricant.

It saves labor and lessens the chances of ruining the cloth by reducing the number of oil applications.

It increases the life of gears, cams and bearings.

The foregoing statements are based solely on the experience of hundreds of cotton mills who are using D-A Lubricant in the following places:

Loom Cams, Pedals, Pick Cams and Balls; Head Gears; Slasher Bearings and Gears; Spinning Frame Gears and Bearings; Picker Gears and Bearings; Foster and Universal Winder Cams; Ball Bearings; Chain Drives; Elevators; Water and Humidifier Pumps.

Packed in barrels, half-barrels and 50-pound cans.

D-A Lubricant Company, Inc.

Indianapolis, Ind.

Southern Representative : : : :	John K. Gewinner, 33 Luckie St., Atlanta, Ga.
New England Representative : : :	MacNichol-Crosby Co., Little Bldg., Boston, Mass.
Chicago Representative : : : :	W. D. Hudson & Sons, 180 N. Wabash Ave.

LUNKENHEIMER

Globe, Angle, Cross and Check Valves

Standard, Fig. 1123.
Extra Heavy, Fig. 884.

Service economy—long life with a minimum cost for up-keep, is the dominant factor which has led to the selection of LUNKENHEIMER Iron Body Valves as "standard equipment" in many leading plants.

Their success in service is the direct result of the combination of correct design with proper materials and the LUNKENHEIMER method of manufacture.

LUNKENHEIMER "Valve-iron" and LUNKENHEIMER "Valve-bronze" are formulated especially for valve service and the LUNKENHEIMER method of manufacture insures dependable results under prescribed operating conditions.

The line embraces a variety of types and sizes in Standard and Extra Heavy Patterns for pressures up to 125 and 150 pounds respectively, whose performance and durability fully measure up to the LUNKENHEIMER high quality standard.

There is a LUNKENHEIMER Distributor in every commercial center ready to give prompt service. Specify LUNKENHEIMER Iron Body Valves and insist on getting what you specify.

Write for catalog No. 58-AK.

13-19-10

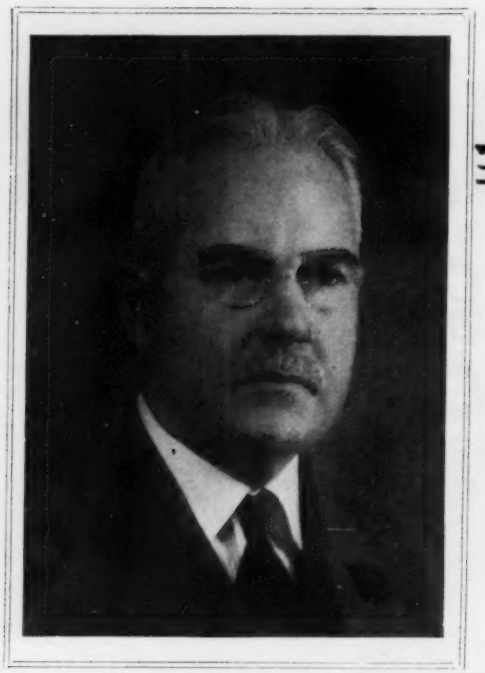
THE LUNKENHEIMER CO.
"QUALITY"

LARGEST MANUFACTURERS OF
HIGH GRADE ENGINEERING SPECIALTIES
IN THE WORLD

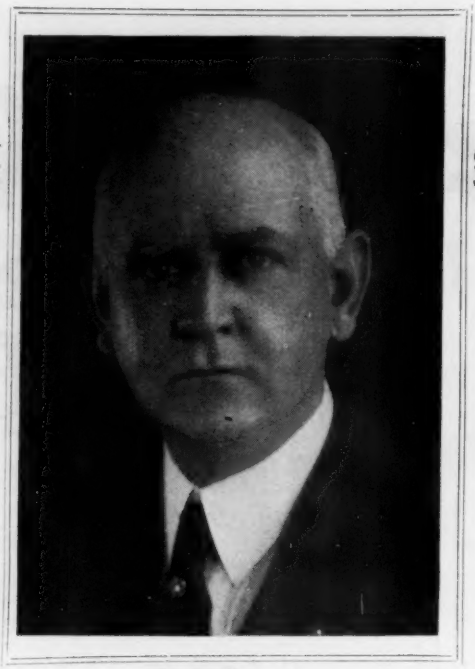
NEW YORK CHICAGO **CINCINNATI, U. S. A.** BOSTON LONDON

EXPORT DEPT., 120-135 LAFAYETTE ST., NEW YORK

AMERICA'S BEST
LUNKENHEIMER
QUALITY
SINCE 1862



J. W. Pope,
Ansley Hotel,
Atlanta, Ga.



G. A. Dean,
Finch Hotel,
Spartanburg, S. C.

James Mohler, Jr.,
Finch Hotel,
Spartanburg, S. C.

Meet these men. They are at your service, ready and willing to give you the benefit of our years of experience in making Staley Starches for the Textile Industry. Meet these men. Quiz them. Use them. They know starches, and what they have to say should prove interesting as well as useful.

Staley's

Note These Features

Staley's Eclipse Thin Boiling Starch

A marked reduction in shedding under the looms, a decrease in the number of seconds, an increase of 10% to 15% in breaking strength and the assurance of a smooth, soft-feeling yarn—

These are not merely "claims" for Staley's Eclipse Thin Boiling Starch. They are facts—**proven results**—results reported by hundreds of the largest starch users in America who are now using Staley's exclusively.

You will obtain absolutely uniform results due to the absolute uniformity of every granule in every bag of Staley's Eclipse. It is under exact scientific control through every stage of every process used in its production. Our enormous plant facilities enable us to produce in carload lots—additional assurance of uniformity. Remember, too, that Staley's PENETRATES AND SATURATES every fibre of the yarn.

Staley's Pearl Starch

is widely known as our standard product for Textile Mill use. It does not have as much binding power as Eclipse, but is highly satisfactory for the work it is called upon to do. Other Staley Starches are specially processed for various kinds of textile work. You can get exactly what you need from Staley.

Let one of our representatives give you ALL the interesting and useful information about our products. It will be more than worth your while. Write

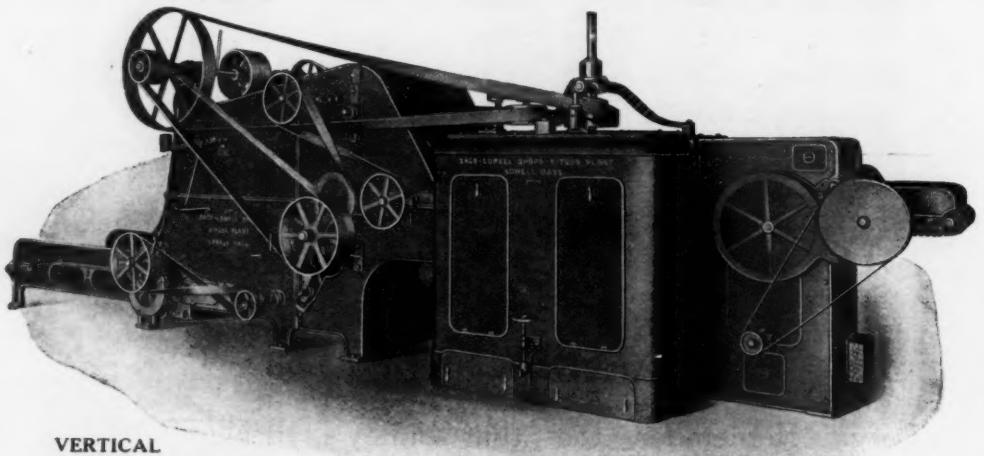
A. E. Staley Manufacturing Co., Decatur, Illinois

Starch

SACO-LOWELL SHOPS
Cotton Machinery

INCLUDING

OPENING, CONVEYING AND DISTRIBUTING EQUIPMENT



VERTICAL
OPENER
COMBINATION

PICKING ROVING WARPING
CARDING SPINNING SLASHING
DRAWING SPOOLING TWISTING

Waste Reclaiming Machinery
Saco-Lowell Card Stripper
Rings and Flyers

SHOPS AT

LOWELL, MASS. BIDDEFORD, ME.
NEWTON UPPER FALLS, MASS.
PAWTUCKET SPINNING RING COMPANY, CENTRAL FALLS, R.I.

EXECUTIVE OFFICES:
BOSTON, MASS.
ROGERS W. DAVIS, Southern Agent, Charlotte, N. C.
Southern Branch Office, Greenville, S. C.

It's economy to use the best picker sticks you can get

even if they do cost you a penny or two more!

And here's why—

—— When your boss weaver wants some sticks in a hurry, he won't find it necessary to go into the supply room and pick over a lot of sticks just to find a few which he considers fit for use. He knows they are all good, and will depend on the last one of them.

—— and your boss weaver also knows that they are all the right size, from top to bottom, and that he won't have to do a lot of additional work on them getting them ready for service.

—— and when they are put on the looms, he knows they are going to stand a lot of hard usage, and are worth every cent they cost.

A picker that stays on your loom and lasts longer than some other stick is not high priced. The length of service is what counts. Our sticks cost no more to begin with than any other good sticks.

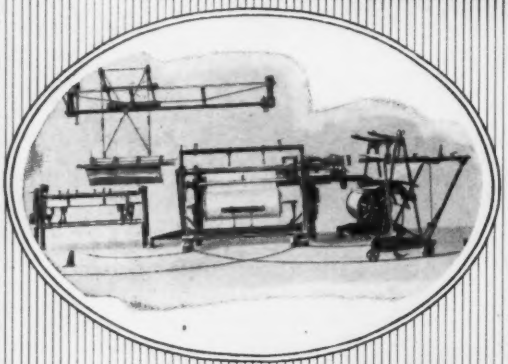
Southern Bending Co.

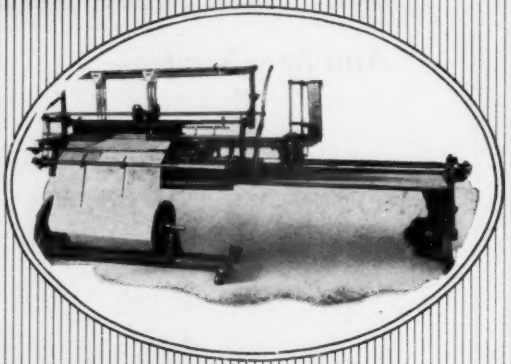
Johnson City, Tenn.

Makers of GOOD Picker Sticks.

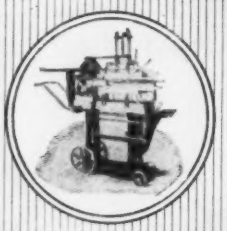
BARBER-COLMAN

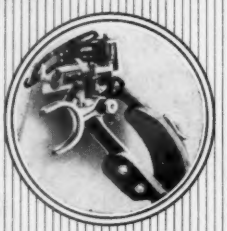
WARP TYING & WARP DRAWING MACHINES
HAND KNOTTERS





THE HOME OF BARBER-COLMAN
PRODUCTS VIEWED FROM AN AIRPLANE

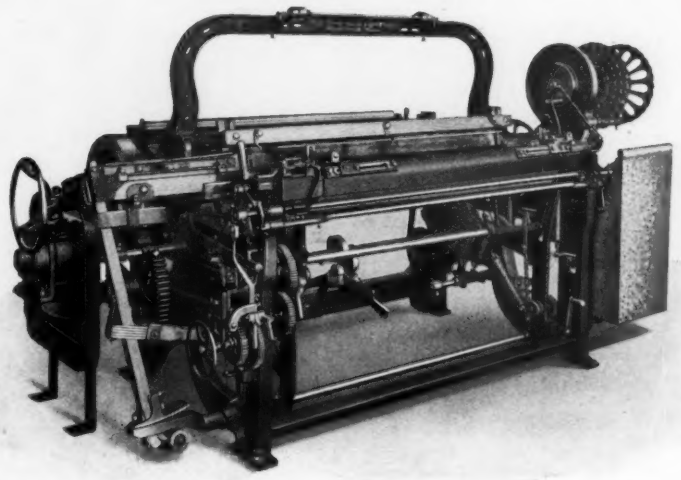




BARBER-COLMAN COMPANY
HOME OFFICE & PLANT
ROCKFORD, ILL., U. S. A.

BRANCH
BOSTON, MASS.

BRANCH
GREENVILLE, S.C.



Stafford Automatic Bobbin-Changing Loom

A SECURE INVESTMENT

We now build Stafford looms with either shuttle or bobbin changing automatic features to meet practically every weaving requirement.

Stafford looms increase production. They substantially reduce weaving costs. They produce fabrics unsurpassed in quality.

Stafford automatic looms are not an expense, they are an investment.

THE STAFFORD COMPANY

READVILLE, MASS.

J. H. Mayes,
Southern Agent,
Charlotte, N. C.

Whitehead, Emmans, Ltd.
Canadian Representatives
Montreal, Canada

Paterson Office
502 Colt Bldg.
Paterson, N. J.

AUTOMATIC
STAFFORD
LOOMS

Yarn is stored and conditioned for about 12 hours in the room on the other side of this partition

Before

Reelings of Yarn taken direct from cone before conditioning.

This apparatus heats the air very hot, produces a high humidity and circulates it in the conditioning room. The high heat softens the waxy constituent of the cotton. The humidity sets the twist. The rapid circulation of air eliminates free moisture.

Conditioned Yarn

makes friends, whether you use it yourself or sell it

After

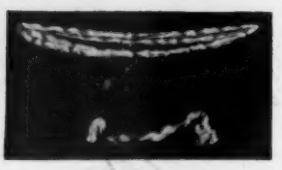
Reelings taken from same cone after treatment 12 hours 95° F 98° RH.

Same Reelings—Note tension required to eliminate kinks

Conditioned—and twist stays but snarls and kinks go.

Other Samples

These photographs were made not by us but by a customer who had operated our conditioning apparatus for five months. They represent his actual and current practice on a production basis.



Other Samples

Textile mills producing sales yarn, especially hosiery yarns, knitting mills and hosiery mills find this apparatus particularly helpful.

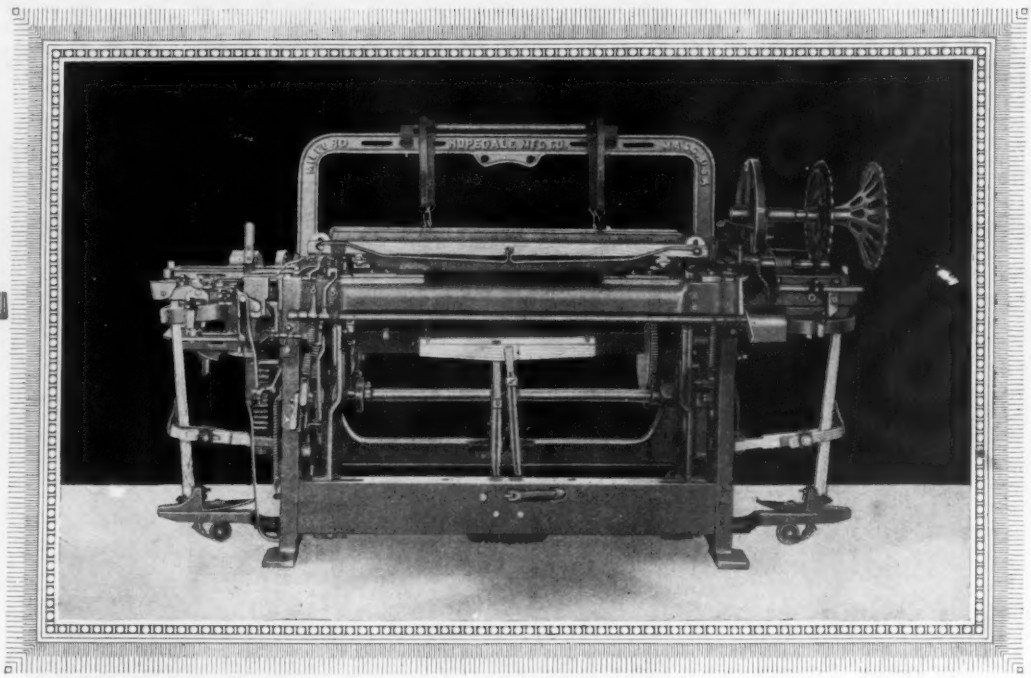
There is more on this subject in our Bulletin 322

Parks-Cramer Company

Engineers & Contractors

Industrial Piping and Air Conditioning

Fitchburg Boston Charlotte



Our Nordray Automatic Loom

STARTS ITS THIRD YEAR WITH MANY IMPROVEMENTS AND CONTINUED APPRECIATION. SOLD AT A REASONABLE PRICE BY

HOPEDALE MFG. CO.

MILFORD, MASS.

JONAS NORTHROP C. H. DRAPER G. O. DRAPER
F. E. NORCROSS FREDERICK SAILS P. J. O'CONNELL

Southern Office, GREENVILLE, S. C.

WHITIN MACHINE WORKS

ESTABLISHED 1831.

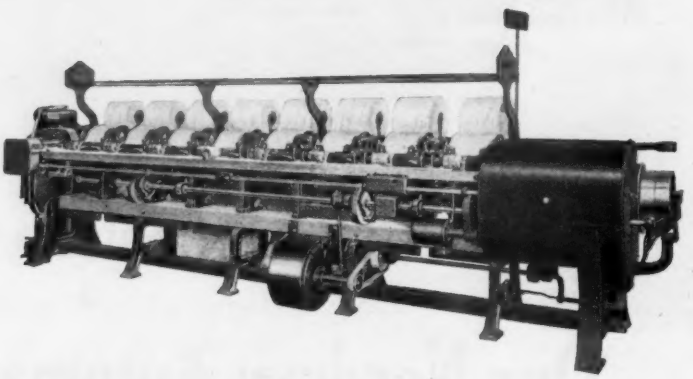
TEXTILE MACHINERY

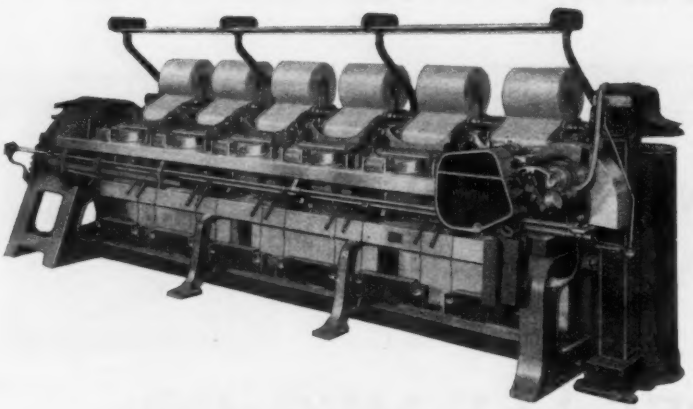
Makers of

COTTON COMBING MACHINES

Meeting all requirements of Textile Manufacturers

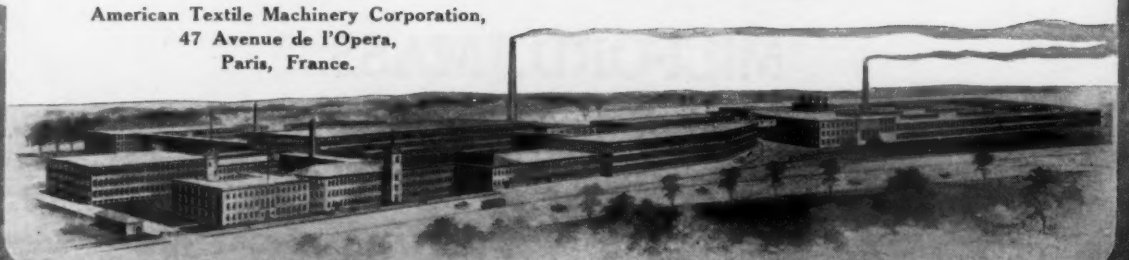
Model D-2 Comber
Whitin Type





Model E. Comber
Nasmith Type

European Agent:
American Textile Machinery Corporation,
47 Avenue de l'Opera,
Paris, France.



MAIN OFFICE AND WORKS

WHITINSVILLE, MASS., U.S.A.

SOUTHERN OFFICE CHARLOTTE, N.C.

Appreciation and Orders

The constant line of interested manufacturers at our exhibit and the business consummated at the Textile Show held at Boston last week, was a marked recognition of the efficiency and value of our systems of humidifying. We can solve any problem in that line. A system for every condition.

American Moistening Company

BOSTON, MASS.

RUSSELL GRINNELL, Pres.

ATLANTA, GA.

FRANK B. COMINS, Gen. Mgr.

Foreign Representatives:

W. R. Grace & Co.
New York (SO. AMERICA)

Andersen, Meyer & Co., Ltd.
Shanghai (CHINA)

W. J. Westaway Co. Ltd.
Hamilton (CANADA)

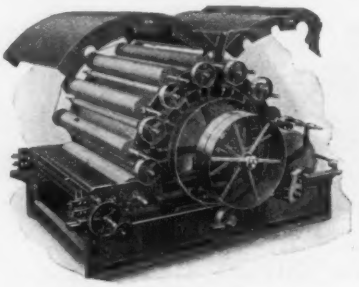
SMITH & FURBUSH MACHINE CO.

PHILADELPHIA

Specialists in machinery for various kinds of WASTES. Builders of Carding and Spinning Machinery for Wool, Asbestos, Cotton-waste and other yarns spun on the wool principle.

Garnetts and Shoddy Machinery. Batt or Felting Machinery, Machinery for wiping and car-box waste.

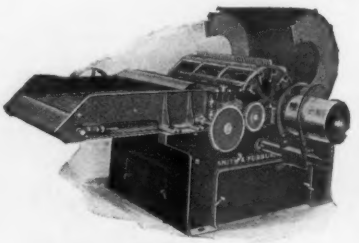
Complete equipments for Rewoven Gunny.



Cotton Waste Card

Ask for Circular S-165

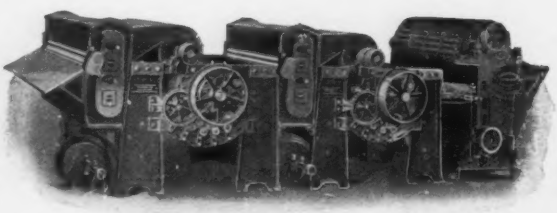
This is one of the carding units in a plant for making mop, cordage or other yarns from cotton waste.



Jute Picker

Circular S-166

This machine is used for opening Gunny and Burlap, forming a part of our equipment for the manufacture of Rewoven Gunny Bagging.

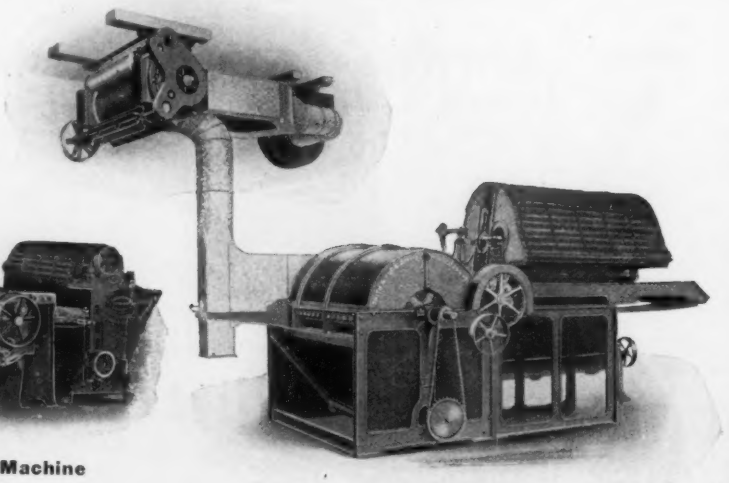


Cotton Waste Reclaiming Machine

(Shaughnesssy Patent)

Ask for Circular S-90

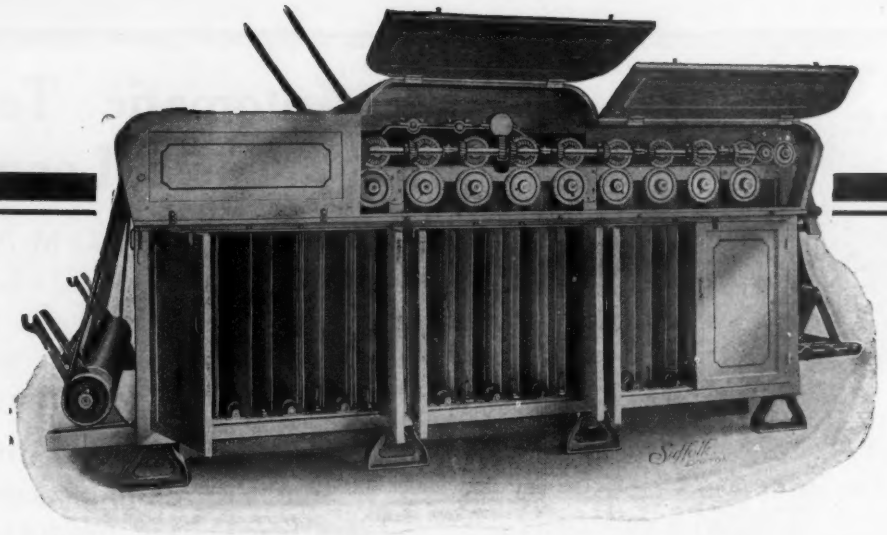
The Shaughnessy Reclaimer does work not done by any other machine in recovering spinning fiber from low grade Cotton Wastes.



Continuous Outfit for Cotton Waste

Ask for Circular S-185

Our continuous outfit removes the loose dirt, dust and bits of iron, wood, etc., from low grade Cotton Waste.



Perfect Cooling and Conditioning Will Improve the Lustre and Finish Of Your Fabrics

Makers of all classes of fabrics have found that

The Manufacturers Cooling and Conditioning Machine

(Patented)

is a very valuable asset to the finishing room of any mill.

It consists of a closed case which exposes the cloth as it leaves the dryer, tenter, or hot calender, close to but not touching a sheet of water. Thus, although no liquid water is deposited on the cloth at all, it absorbs of its own volition atmospheric vapor to an extent that is normal for its temperature, and will not lose any of the weight which it has gained, unless it is again subjected to a hot process.

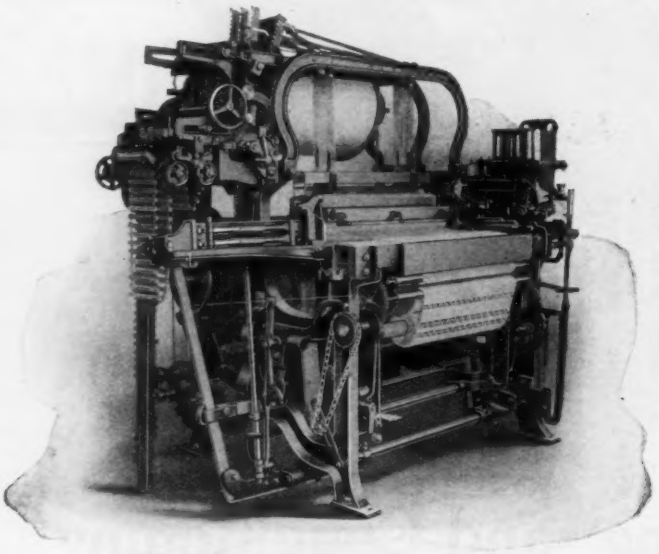
The fabric leaves the machine thoroughly cooled, with the handle and appearance greatly improved. There is imparted to it a rich softness, entirely free from shadiness as often caused by uneven cooling, or cooling in the roll. Mills are successfully operating these machines on the following cotton fabrics:

Blankets Flannels Domets Shirtings Pongees Lawns Cretonnes Ginghams Damasks Tablecloths Sheetings Voiles Denims

Actual tests which show the gains to be expected on any of the above fabrics will be sent on request.

MANUFACTURERS MACHINE COMPANY

Sales Department, 120 Milk St., Boston, Mass.
Factory: North Andover, Mass.



Automatic Terry Towel Loom

The AUTOMATIC TERRY TOWEL LOOM shown here, is of the Dobby type and is used for weaving towels with colored borders.

A large number of these looms are running successfully with increased production per weaver and greatly reduced operating costs.

CROMPTON & KNOWLES LOOM WORKS

—WORCESTER, MASS.—

PROVIDENCE, R. I. PHILADELPHIA, PA. PATERSON, N. J.

ALEXANDER & GARSED—Charlotte, N. C.—Southern Representatives

American Textile Machinery Corp., 47 Ave. de l'Opera, Paris—Representatives for Continental Europe

Napper Roll Grinder

LOWER THE COST OF TEXTILE MACHINERY

Every REAL buyer of machinery, when figuring cost, figures not only the original cost but the probable cost of up-keep.

Roy Grinders, by keeping such machines as cotton cards, nappers, garnetts and calenders in top-notch condition at very small expense, actually reduce the "cost" of these machines.

Write for full details of Roy Grinders

B. S. ROY & SON CO., Worcester, Mass.

ESTABLISHED 1868

E. M. TERRYBERRY, *Southern Agent*
1126 Healey Bldg., Atlanta, Ga.

Canadian Representative
W. J. WESTAWAY CO. LTD.,
Hamilton, Ontario

SPINNING RING

GROUND to Fight Friction—

RIGHT in Design—

EFFECTS Mill Economy—

INVESTMENT worth while—

SPINS a strong, high quality yarn—

TRUE Traveler Track

The Greist Manufacturing Company

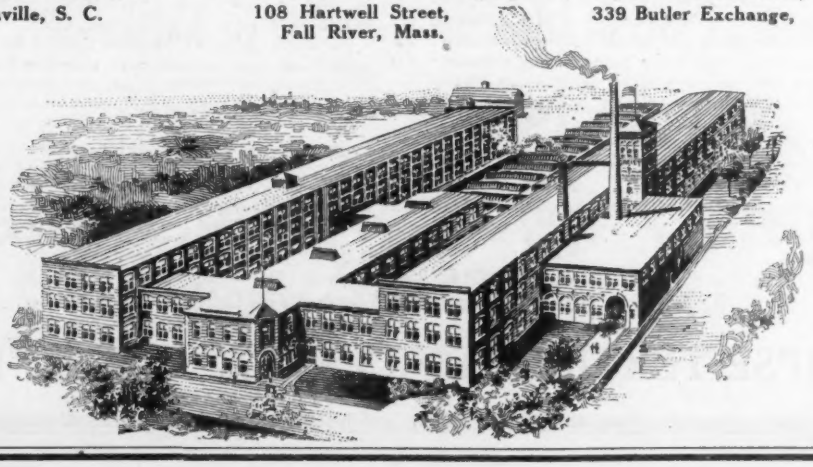
Precision Manufacturers for 40 Years

Dept. C, New Haven, Conn.

Southern Representative:
The G. G. Slaughter Machinery Co.
Greenville, S. C.

Fall River and New Bedford:
Coldwell Gildard Company
108 Hartwell Street,
Fall River, Mass.

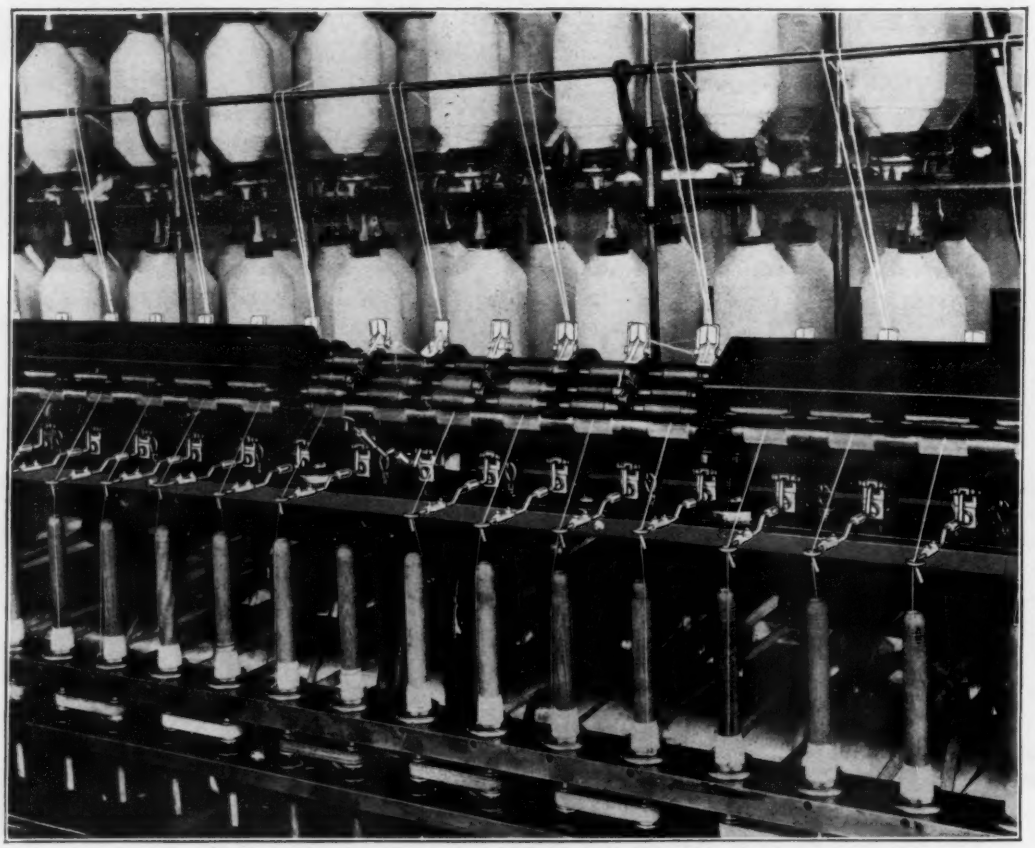
New England Representative:
Boyd's Textile Bureau, F. W. Boyd, Mgr.
339 Butler Exchange, Providence, R. I.



AUTOMATIC STOP-MOTION DEVICE

for

SPINNING AND TWISTING



ITS simplicity and effectiveness is proved beyond doubt. The complete control of the spinning frame is placed in the hands of the operative.

When an end breaks the stop-motion automatically covers the roving and instantly stops waste. It also operates when one or both bobbins are emptied, thus allowing all of the roving to run from bobbins. 90% saving is made in waste, not to speak of the labor saving and the prevention of mutilated bobbins.

At the Boston Textile Exposition the Eclipse Automatic Stop Motion was conceded to be one of the outstanding improvements of the Industry.

No more rolls can become spoiled by laps. The leather or steel remains true and free from bruises. This decreases broken ends, and produces a more even yarn. There is 95% perfect condition of rolls and a 75% saving in top roll covering.

Actual operating conditions prove that this perfect device makes these worth-while savings and furthermore saves 40% of labor cost of spinning, increasing the efficiency of spinning frame operatives wonderfully.

Let us send you full information.
A line today will bring it promptly.

ECLIPSE TEXTILE DEVICES, Inc., Elmira, N. Y.

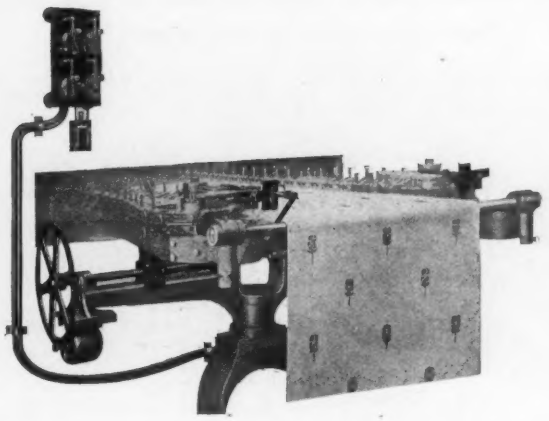
The Schwartz Automatic Electric Guider

For

Straight and Swing Tenter Frames

Handles cloth of any kind, weight or width

A Labor-Saving Attachment of Proven Efficiency



Specified in the largest mills in the country

Manufactured and Distributed by

Blake Electric Mfg. Company

1 Rowes Wharf, Boston, Mass.

For information write Dept. G.

Howard Bros. Mfg. Co.

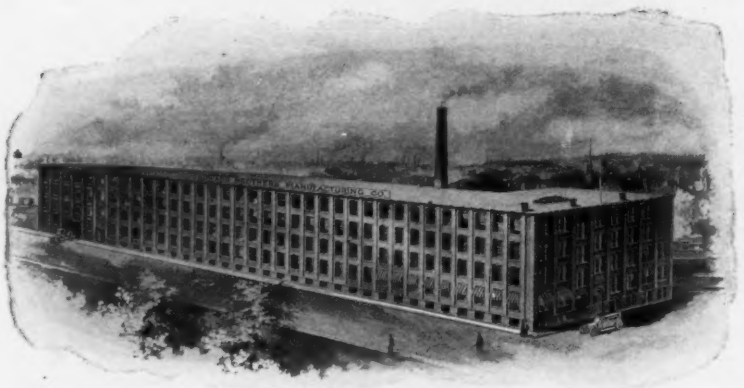
Established 1866
WORCESTER, MASS.

ATLANTA, GA.
Agent
E. M. TERRYBERRY
1126 Healey Bldg.

PHILADELPHIA, PA.
Agent
JOSEPH A. BOLGER,
4925 Royal St.
Germantown.

CARD CLOTHING

Napper Clothing
Heddles for any loom



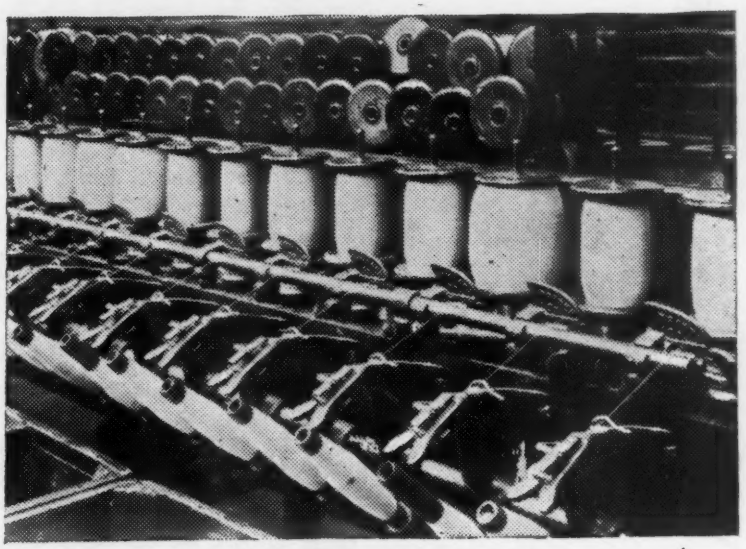
Card clothing for cotton, woolen and worsted cards.

Cylinder Fillets
Top Flats Reclothed
Doffer Fillets
Stripper Fillets
Burnisher Fillets

Napper Clothing for All Styles of Machine and Cloth
Midgley's Improved Hand Stripping Cards, All Lengths and Sizes

QUALITY AND SERVICE ALWAYS GUARANTEED

L-V-B SPOOLER TENSION



L-V-B Tension Device in New Bedford Mills.

Here's What One Mill Saves

In a mill that changed from warp to filling wind on 20,000 lbs. production, the following result was obtained:

Warp Wind	Filling Wind
Stick Waste 80%	Stick Waste 60%
Spooler Waste 200 lbs.	Spooler Waste 50 lbs.
1050 doffs.	650 doffs.

Increased production 5% due to less doffing and less breakage.

Changed warp bobbins 7 15/16 to filling bobbins 8¾".

Increased speed of spooler from 800 R.P.M. to 1200 R.P.M.

Illuminated 1/3 of spoolers; also improvement on slashing and weaving.

Change from Warp to Filling Wind. Try it out at our expense.

Send 2 filled bobbins and we will forward sample tension on approval.

The L-V-B Spooler Tension means greater production, better spinning and 50% Saving in Waste. Ask for a list of mills that are using L-V-B Tensions.

ADDRESS

Textile Specialty Company

P. O. Box 255, New Bedford, Mass.

Southern Representative: A. B. CARTER, 210 Realty Bldg., Gastonia, N. C.

SPECIALISTS IN MARKING MACHINES

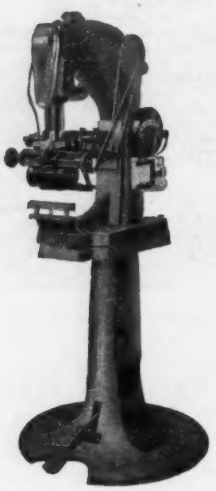
Carton Marker

The Carton Marker is for printing the size, descriptive names or colors, style numbers, or lot numbers, on the carton or the label, giving an absolute uniform result on all your containers; eliminating the poor and blurry mark that is usually obtained by the use of hand stamps.
Over 500 of these equipments are in operation.

Is adapted for marking the set-up, folding or telescopic carton.

Price of standard equipment, $300.

Textile Marker



The standard Textile Marker designated as an M-5 equipment, is for placing identification marks on pieces before going into the dye, bleach and finish, or any other operation in which the material requires marks for identification purposes, eliminating any possibility of error or short measure. Gives you a true check on your yardage. Price for standard equipment, $300.

Coupon Marker

The Coupon Marker, used in connection with piecework pay-roll systems, where the coupon method is operated. Prints at the rate of 375 a minute. Has rotating type wheels which enable the operator to set various numbers at will, and is the solution for marking where this system is installed. There are over 400 of these in use.
Price of standard equipment, $250.

MARKEM MACHINE CO.

232 Summer St., BOSTON, MASS.

How Six People Save 1,000 Working Hours

A South Carolina Textile Mill which furnishes employment for 350 families was losing 1,000 productive hours per week to the family wash-tub.

The 100 or more women, each of whom took ten hours off each week to do the family washing, were usually so exhausted on the following day that the mill suffered a second loss.

And the company never knew just how many hands it could depend upon—it never could rely upon a certain number of looms being in operation on any certain day or for any certain length of time.

Recently this mill invested a nominal amount of its capital in an American Mill Village Laundry.

The plant was placed in charge of a washerman and five women helpers—negresses who were of no use in the mill.

These six laundry operators, benefiting from intensive training from a corps of American demonstrators, handled without difficulty all of the washing and ironing for the village.

And with these six cleansing specialists the company is saving 1,000 valuable working hours in the mill each week.

Employees have an abundance of clean, fresh clothes at a price that everyone can afford to pay, and yet, so efficient is the operation of this American Mill Village Laundry, that it is actually earning a dividend of 20 per cent on the investment.

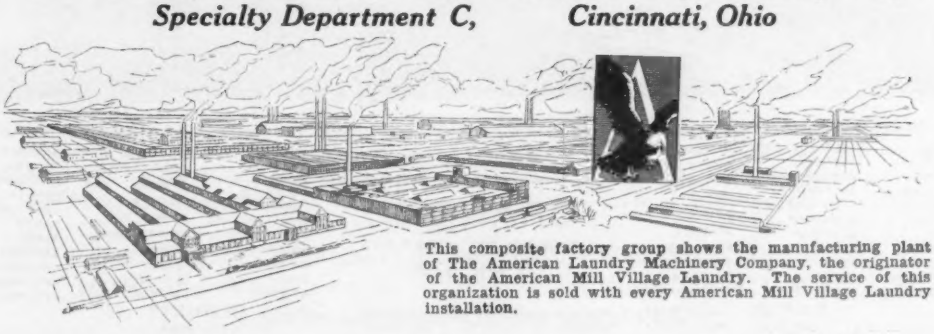
"Taken all in all," says the general manager, "it's far and away the best investment we ever made."

It would be an equally excellent investment for your mill. The expert assistance of our engineering staff is yours for the asking, if you would have the layoff situation analyzed in your plant.

Write us today—it will not obligate you in the least.

The American Laundry Machinery Company

Specialty Department C, Cincinnati, Ohio



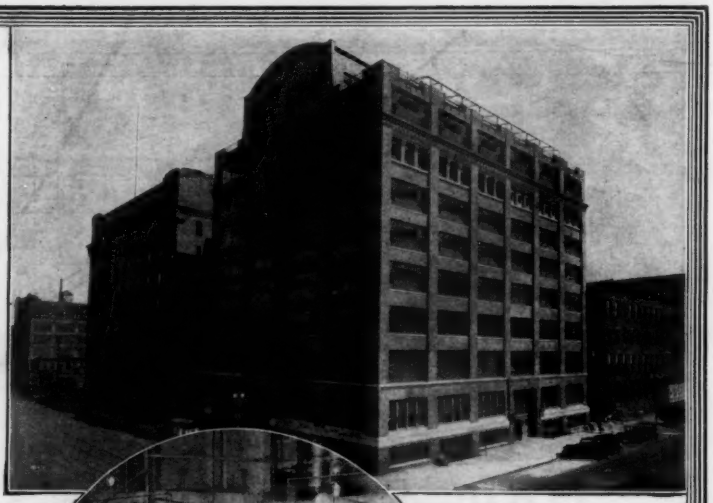
This composite factory group shows the manufacturing plant of The American Laundry Machinery Company, the originator of the American Mill Village Laundry. The service of this organization is sold with every American Mill Village Laundry installation.

IN the power plant and sanitation equipment of modern industry

CRANE SERVICE

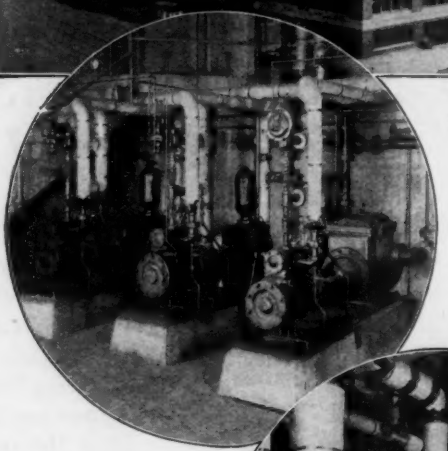
assures permanent satisfaction; whether it be the drainage piping or the plumbing fixtures of an extensive sanitation arrangement, or the high pressure superheated steam lines of an enormous power plant.

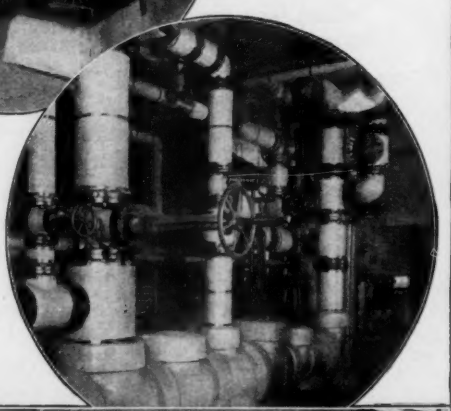
We are manufacturers of about 20,000 articles, including valves, pipe fittings, and steam specialties, made of brass, iron, ferrosteel, cast steel and forged steel, in all sizes, for all pressures and all purposes, and are distributors through the trade, of pipe, heating and plumbing materials.



M. E. Smith Building
Omaha, Nebraska
Crane Equipped

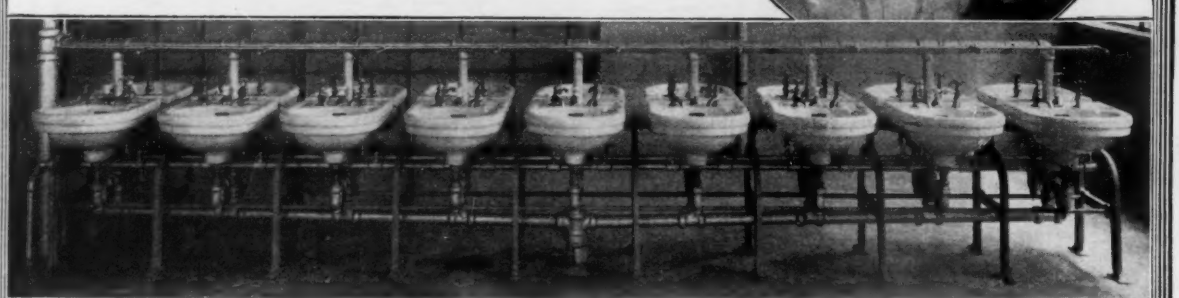
F. S. Stott
Architect





Jas. A. Stewart & Co.
General Contractors

Sanitary Plumbing Co.
Pl'g. & Htg. Contrs.



SALES OFFICES, WAREHOUSES AND SHOWROOMS:

BOSTON, SPRINGFIELD, HARTFORD, BRIDGEPORT, ROCHESTER, NEW YORK, HARLEM, ALBANY, BROOKLYN, PHILADELPHIA, READING, ATLANTIC CITY, NEWARK, CAMDEN, BALTIMORE, WASHINGTON, SYRACUSE, BUFFALO, SAVANNAH, ATLANTA, KNOXVILLE, BIRMINGHAM, MEMPHIS, LITTLE ROCK, MUSKOGEE, TULSA, OKLAHOMA CITY, WICHITA, ST. LOUIS, KANSAS CITY, TERRE HAUTE, CINCINNATI

FOUNDED BY R. T. CRANE, 1855

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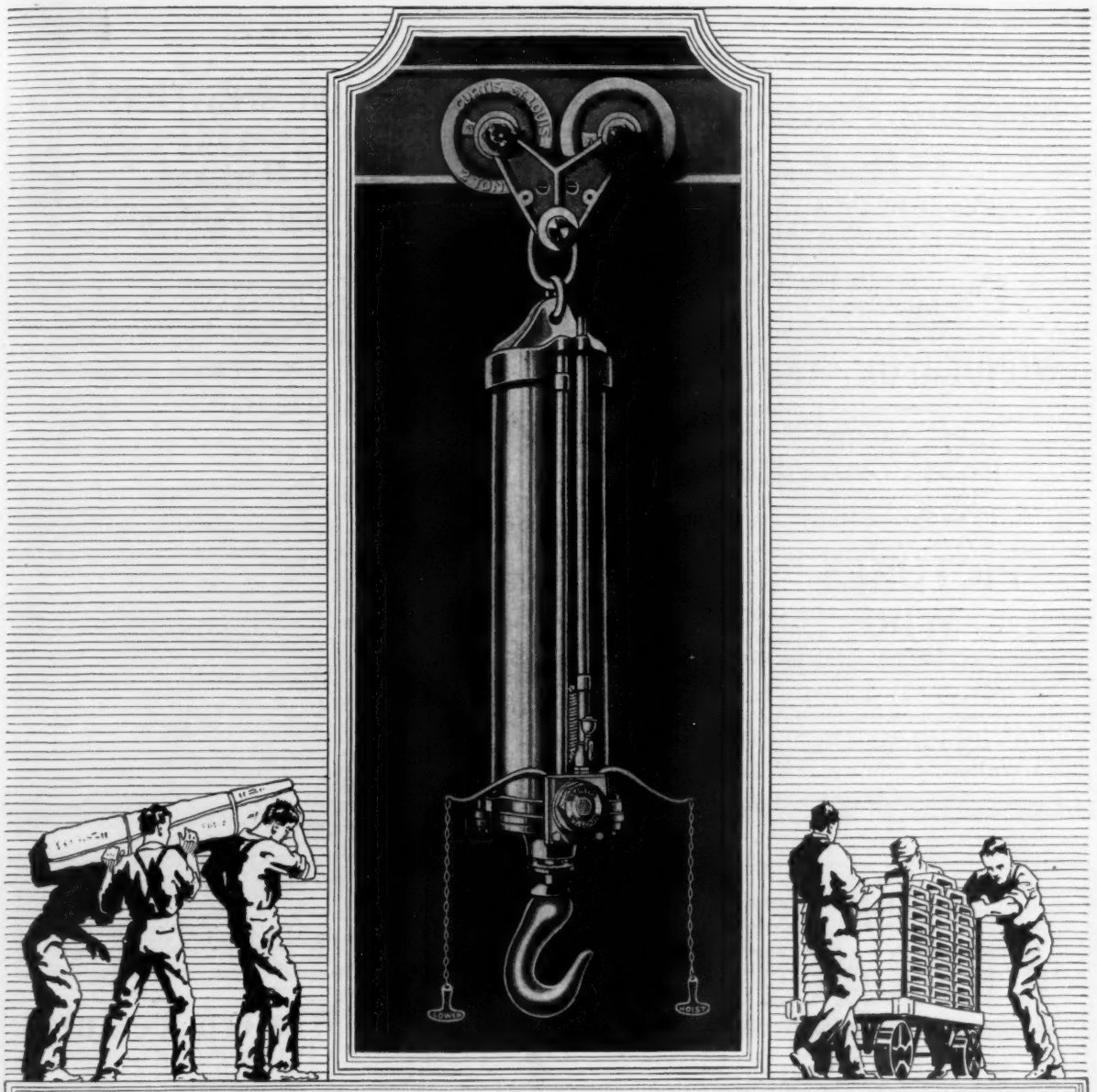

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CURTIS Trolleys are constructed with self-equalizing steel side frames and large inclined wheels fitted with shock-absorbing Flexible Roller Bearings — making them easy to start — easy rolling and long lasting.

CURTIS All-Steel Air Hoists, in design and construction, present the perfected results of 25 years of manufacture. They are simple, safe and economical for light and medium loads. Capacities, 800 to 20,000 lbs.

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Released one every week Twelve Fairbanks, eight Harts. The newest product of these stars.

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THAT WILL FILL YOUR THEATRE
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Thrilling Western Features

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and

A Big Animal Serial

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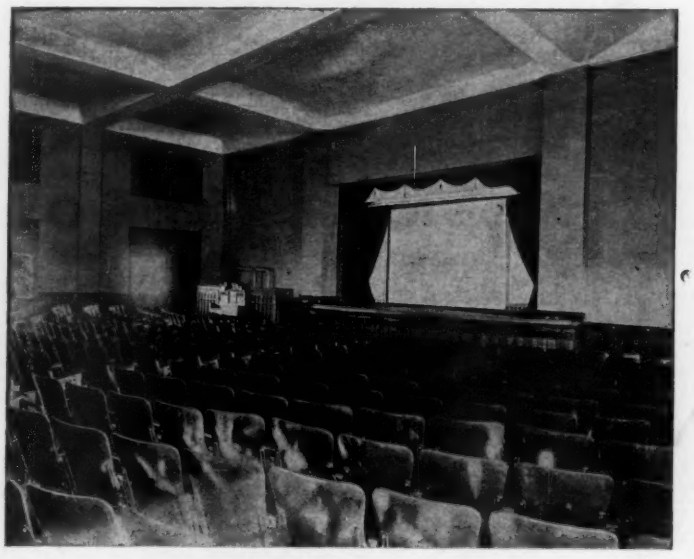
Is Your Name Written There?

Our service to the textile mills is the result of years of experience in installing textile theatre equipment. Our representatives call upon the mills personally, lay out the plans, advise on the proper equipment required and finally supervise the installation and the starting of the theatre. In other words, they take the whole problem off from your hands and do not turn over the work to you until the theatre is operating satisfactorily.



A Typical Textile Mill Theatre.

The textile industry is demanding the best moving pictures for their employees and that is why they regularly specify

POWER'S PROJECTORS

That is why more Power's Projectors are used by textile mills in the South than all other projectors combined.

Satisfied Users of POWER'S PROJECTORS

ALABAMA

W. A. Handley Mfg. Co.	Roanoke
Tallassee Mills	Tallassee
Fairfax Mill	Fairfax
Avon Mills	Sylacauga
Lanett Cotton Mills	Lanett
Indian Head Mills	Cordova
Selma Mfg. Co.	Selma

GEORGIA

Elm City Cotton Mills	La Grange
Bibb Mfg. Co.	Porterdale
Roswell Mfg. Co.	Roswell
Gainesville Cotton Mill	Gainesville
Bibb Mfg. Co.	Columbus
Pacolet Mfg. Co.	New Holland
Manchester Cotton Mills	Manchester
Milstead Mfg. Co.	Milstead
Thomaston Cotton Mills	Thomaston
Exposition Cotton Mill	Atlanta
Habersham Mill	Habersham
Trion Company	Trion
Union Point Mfg. Co.	Union Point
Hillside Cotton Mill	LaGrange

NORTH CAROLINA

Durham Hosiery Mills	Durham
Pamona Mills	Greensboro
Cleveland Mill & Power Co.	Lawndale
Rodman-Heath Cotton Mills	Waxhaw
Rocky Mount Mills	Rocky Mount
Cherokee Falls Mfg. Co.	Cherokee Falls
Roxboro Cotton Mills	Roxboro
Consolidated Textile Corp.	Burlington
Carolina Cotton & Woolen Mills	Spray

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Baldwin Cotton Mills	Chester
Tucapau Mills	Tucapau
Ware Shoals Mfg. Co.	Ware Shoals
Glenn-Lowry Mfg. Co.	Whitmire
Monaghan Mills	Greenville
Drayton Mills	Spartanburg
Victor Mills	Greer
Conestee Mills	Conestee
Kershaw Cotton Mills	Kershaw
Abbeville Cotton Mills	Abbeville
Chesnee Mills	Chesnee
Union-Buffalo Mills	Buffalo
Victor-Monaghan Mills	Seneca
Victor-Monaghan Mills	Jonesville
Pacolet Mfg. Co.	Pacolet
Aragon Mills	Rockhill
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Woodside Cotton Mills	Greenville
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Clifton Mfg. Co.	Clifton
D. E. Converse Co.	Glendale
Winnsboro Mills	Winnsboro
Monarch Mills	Lockhart

We carry a complete line of supply parts and equipment at our various branches. Your orders for supply parts will be filled the same day the order is received. Whatever are your needs for your theatre, we can supply them.

We have a special offer for the Textile Mills. May we present it to you?

Southern Theatre Equipment Company

WILLIAM OLDKNOW, President,

No. Nine Nassau St.
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THREE TWENTY-EIGHT CALIFORNIA ST.,
OKLAHOMA CITY, OKLA.

Eighteen Fifteen Main St.
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Wooden Packing Cases

All Styles

Manufactured from
Georgia Pine
White Pine
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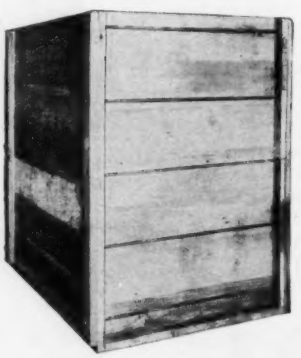
and Gum

The interlocking packing case, shown in the upper left-hand corner, has advantages over other packages, especially for carrying heavy materials. In the first place lighter weight material can be used in its construction on account of the interlocking reinforcement. It is harder to pilfer or break open than other packing cases.

We are now in position to give all orders for shooks prompt attention, and will be glad to quote prices and delivery dates on any cases you might require. Our prices are very much reduced, try us.

In addition to rectangular tanks, we manufacture a complete line of round tanks equipped with round iron hoops and malleable draw lugs.



All our tanks are manufactured from heart cypress tank stock and we guarantee them to hold water.

Your inquiry solicited.

Hightower Box & Tank Co.

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Box 1025 **Atlanta, Ga.**

Roll Call

of White Trucks *in* the Textile Industry

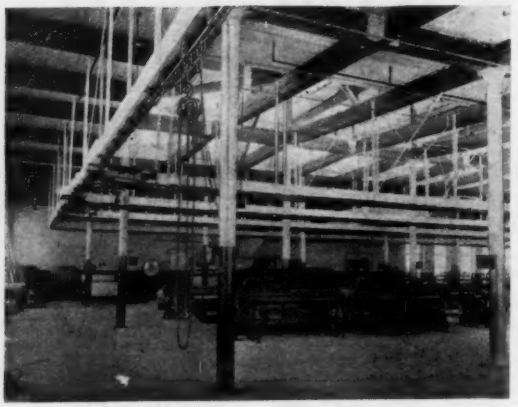
THE dependable performance of White Trucks in the Textile Industry is evidenced by the rapid increase in the number of companies operating Whites. The following representative Textile Manufacturers operate a total of 305 White Trucks.

American Woolen Co.	Lawrence, Mass.
Amoskeag Manufacturing Co.	Manchester, N. H.
Andrews Mills	Woonsocket, R. I.
Aragon Mills	Aragon, Ga.
Arlington Mills	Lawrence, Mass.
Ashworth Brothers, Inc.	Fall River, Mass.
Atlanta Woolen Mills, Inc.	Atlanta, Ga.
The Augusta Factory	Augusta, Ga.
Avondale Mills	Birmingham, Ala.
Joseph Bancroft & Sons Co.	Wilmington, Del.
Barnard Manufacturing Co.	Fall River, Mass.
Baylis Sanitary Supply Co.	Chicago, Ill.
The Beckman Co.	Cleveland, Ohio
Bibb Manufacturing Co.	Macon, Ga.
Joseph Block	Philadelphia, Pa.
Brookford Mills Co.	Hickory, N. C.
Thomas E. Brown & Sons	Philadelphia, Pa.
Burson Knitting Co.	Rockford, Ill.
Cannon Manufacturing Co.	Concord, N. C.
Chadwick-Hoskins Co.	Charlotte, N. C.
Wm. B. Chant & Sons	Port Jervis, N. Y.
Cheney Brothers	South Manchester, Conn.
Cia Confianca Industrial	Rio de Janeiro, Brazil
Clark-Cutler-McDermott Co.	Franklin, Mass.
Cleveland Worsted Mills Co.	Cleveland, Ohio
Cleveland-Akron Bag Co.	Cleveland, Ohio
Collier Mills, Inc.	Barnesville, Ga.
Conestee Mills	Greenville, S. C.
Conestee Mills	Conestee, S. C.
Crompton Co.	Providence, R. I.
Dallas Manufacturing Co.	Huntsville, Ala.
Henry Doherty Silk Co.	Clifton, N. J.
Durham Hosiery Mills	Charlotte, N. C.
Durham Hosiery Mills, Inc.	Durham, N. C.
Dwight Manufacturing Co.	Birmingham, Ala.
Earlston Worsted Mills, Inc.	Greenville, R. I.
Egypt Silk Mills Corp.	New York City
Ellis Cotton Co.	Atlanta, Ga.
A. D. Ellis & Sons	Monson, Mass.
John B. Ellison & Sons	Philadelphia, Pa.
Establecimientos Americanos	Valparaiso, Chile
Eva Jane Mills	Sylacauga, Ala.
Everlastic, Inc.	Chelsea, Mass.
Faith Knitting Co.	Troy, N. Y.
Fellows-Huber Silk Co.	Stroudsburg, Pa.
Geo. M. Finn	Syracuse, N. Y.
Fonda Glove Lining Co.	Fonda, N. Y.
Georgia Cotton Mills, Inc.	Atlanta, Ga.
Georgia Duck & Cordage Mills	Scottdale, Pa.
The Goodyear Cotton Mills	Goodyear, Conn.
Grantville Hosiery Mills	Greenville, Ga.
The Groveland Mills	Groveland, Mass.
Paul Guenther, Inc.	Dover, N. J.
Haas Brothers	New York City
Halcyon Knitting Mills Co.	Bethlehem, Pa.
Halperin Mills	Brooklyn, N. Y.
Hamilton Woolen Co.	Boston, Mass.
Louis E. Harrower & Son	Amsterdam, N. Y.
Heinsheimer Bros.	New York City
Highland Cordage Co.	Hickory, N. C.
Highland Park Mfg. Co.	Rock Hill, S. C.
Samuel Hird & Sons, Inc.	Passaic, N. J.
Holeproof Hosiery Co.	New York City
Andrew Howarth & Son	Oxford, Mass.
S. Hyman Co.	New York City
Indian Bleaching, Dyeing & Printing Works	Bombay, Ind.
Interwoven Mills, Inc.	Martinsburg, W. Va.
Kayser Silk Co.	Sherburne, N. Y.
Killingly Manufacturing Co.	Killingly, Conn.
Thomas Kitson & Son, Inc.	Stroudsburg, Pa.
B. B. & R. Knight	Providence, R. I.
B. B. & R. Knight	Manchaug, Mass.
Louis Kraemer & Co.	Stony Creek, Pa.
Krout & Fite Manufacturing Co.	Philadelphia, Pa.
The Laidlaw Co., Inc.	New York City
Lancaster Mills	Clinton, Mass.
James Lees & Sons Co.	Bridgeport, Pa.
The Livingston Worsted Co.	Washington, R. I.
Locke Cotton Mills Co.	Concord, N. C.
Lois Cotton Mills	Douglasville, Ga.
McCallum Hosiery Company	Northampton, Mass.
Majestic Manufacturing Co.	Belmont, N. C.
Massachusetts Cotton Mills	Lindale, Ga.
Mazuy Mills	Newton, N. J.
Millville Manufacturing Co.	Millville, N. J.
Milstead Manufacturing Co.	Milstead, Ga.
Mollohon Manufacturing Co.	Newberry, S. C.
Monarch Mills, Inc.	Lockhart, S. C.
Monarch Mills, Inc.	Union, S. C.
Narrow Fabric Co.	Reading, Pa.
Newberry Cotton Mills	Newberry, S. C.
Newnan Cotton Mills	Newnan, Ga.
Nonotuck Silk Co.	Leeds, Mass.
Norwich Knitting Co.	Norwich, N. Y.
Pacific Mills	Columbia, S. C.
Pacific Mills	Lawrence, Mass.
Frank F. Pels & Co.	New Durham, N. J.
Frank F. Pels & Co.	New York City
Phoenix Silk Manufacturing Co.	New York City
The Phoenix Woolen Co.	Stafford Springs, Ct.
Piedmont Manufacturing Co.	Piedmont, S. C.
Piedmont Silk Co., Inc.	Chambersburg, Pa.
Richmond Hosiery Mills	Chattanooga, Tenn.
The Rich-Sampliner Co.	Cleveland, Ohio
Riverside & Dan River Mills	Danville, Va.
Rockford Mitten & Hosiery Co.	Rockford, Ill.
Rockland Webbing Co.	Rockland, Mass.
Russell Manufacturing Co.	New York City
A. H. Sands & Company	New York City
E. D. Sasson & Co.	Bombay, India
S. A. Fabrica da Sedas Helena	Rio de Janeiro
Shawmut Woolen Mills	Stoughton, Mass.
Sherman Manufacturing Co.	Sherman, Texas
A. A. Shuford Mill Co.	Hickory, N. C.
R. H. Simon Silk Co.	Easton, Pa.
Southern Manufacturing Co.	Athens, Ga.
Springfield Cotton Mills	Laurel Hill, N. C.
Stafford & Co.	Philadelphia, Pa.
Star Thread Mills	Athens, Ga.
Stark Mills	Manchester, N. H.
J. L. Stifel & Sons	Wheeling, W. Va.
Stone Cutter Mills Co.	Spindale, N. C.
Stroock Plush Co.	Newburgh, N. Y.
Summerville Cotton Mills	Summerville, Ga.
Union Manufacturing Co.	Union Point, Ga.
Utica Steam & Mohawk Valley Cotton Mills	Utica, N. Y.
Valatie Yarn Co.	Valatie, N. Y.
Virginia Cotton Mills	Swepsonville, N. C.
The Viscose Co.	Marcus Hook, Pa.
The Wallace Wilson Hosiery Co.	Philadelphia, Pa.
Louis Walther Mfg. Co.	Philadelphia, Pa.
Wamsutta Mills	New Bedford, Mass.
Wateree Mills, Inc.	Camden, S. C.
Weiner Bros.	New York City
West Point Manufacturing Co.	West Point, Ga.
White Haven Silk Co.	White Haven, Pa.
White-Williamson Co.	Burlington, N. C.
Jas. N. Williamson & Co.	Burlington, N. C.
Winnsboro Mills, Inc.	Winnsboro, S. C.
Winona Cotton Mill	Winona, Miss.

There are now in actual service 4,707 White fleets, comprising 47,351 trucks, exclusive of single truck installations.

THE WHITE COMPANY, *Cleveland*

White Trucks



Cut Your Overhead

with a

Richards-Wilcox

OVER-WAY TRADE MARK

Conveying System

Many of the most progressive mills in the country have installed OveR-Way conveying systems, with a big saving in time as well as money as the result. Your mill will show a greater profit, production will be speeded up and your employes will appreciate the labor saved through the installation of an OveR-Way conveying system. Our illustration shows a small part of an OveR-Way equipment in the Winnsboro Mills at Winnsboro, S. C. Every OveR-Way installation is built to fit the requirements of the plant it goes into.

Write for our Catalog GA23

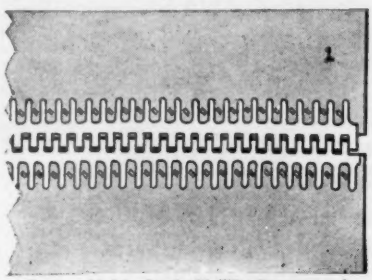
Richards-Wilcox Mfg. Co.
A Hanger for any Door that Slides
CHICAGO ST. LOUIS LOS ANGELES PHILADELPHIA
AURORA, ILLINOIS, U.S.A.
BOSTON NEW YORK MINNEAPOLIS SAN FRANCISCO
CLEVELAND — INDIANAPOLIS
LONDON, ONT.

Why Good Belts Often Fail In Ordinary Service

Purchasing Department Often Wrongly Criticised

The buying of a belt generally receives the most serious consideration from the up-to-the-minute purchasing department, especially as there are so many kinds and types to choose from, each having its own definite claim to distinction.

However, as it is generally pretty well known just what belts will

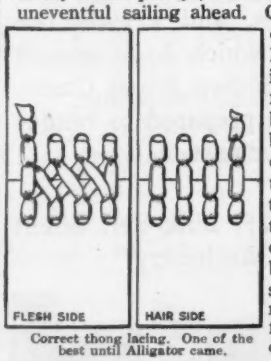


Section of belting laced with "The Strongest and Best Lacing on Earth."

give better service than any other under certain working conditions, the matter frequently becomes only a question of H. P.'s, diameter, revolution, distances, position, etc. With this covered, too often belts and the ones who bought them receive censure.

Belt Lacing Important As Belt Buying

One would think that with the right belt finally on the pulleys, there would be easy, uneventful sailing ahead. Often it is—oftener perhaps, not. It is neither the fault of the belt nor the buyer — not once in a thousand times, when the belt gets out of shape, begins to act skittish and run wild, and finally falls off useless.



Correct thong lacing. One of the best until Alligator came.

Do Not Depend Too Strongly On Rawhide Lacing

A neat job of rawhide lacing may only be the cause of chronic belt ailment. Appearances are deceptive, as a first-class looking job often proves in practice. Stretching, twisting, wobbling and "jumping" at the pulleys are only a few of the charges against it.

ALLIGATOR Steel Belt Lacing is Good All the Way Through

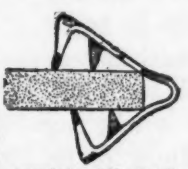
ALLIGATOR is made along simple practical lines, for any belt service — and it stays "put." Its double staggered teeth grip like an Alligator—and never lets go, once it has secured a hold. And ALLIGATOR Steel Lacing makes a perfect joint. These are the reasons of its wonderful popularity and universal usage throughout the industrial world.

Another feature is that the ALLIGATOR laced belt joint does not jump the pulleys and does not allow the belt to twist or run crooked. It is flexible and hugs the pulleys. It can be run with both surfaces in contact with the pulleys. The steel rocker hinge pin insures frictionless operation of the joint.

Pull Comes on Edge of Teeth —Not on Flat Side

Note that the ALLIGATOR teeth clinch through the belt **edgewise to the pull** and therefore cannot injure or cut the lengthwise fibers which support the pull. This is one big reason why ALLIGATOR laced joints last longest.

"Nothing Needed But a Hammer"



Actual size of No. 25 Alligator for single leather or 4-ply fabric 3-16 to 9-32 thick. Note double staggered teeth.

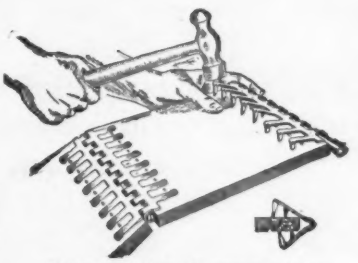
Aside from its other superiorities, so simple is ALLIGATOR Steel Belt Lacing, so easy is it to attach, that only a hammer is needed from first to last to make a perfect joint. No machinery needed here. No long processes consuming time and labor. Ordinary intelligence and a hammer can do the trick in three minutes. And the job won't go wrong next day. It stays "put."

Most Belt Users for Alligator

Judging from the quantities ordered and in use in the industrial world today, ALLIGATOR has the preference over all other types of belt lacings. Many who

Rocker pin makes possible the use of a hinge belt joint in damp places and under heavy loads where a rawhide pin will not stand up.

would like to use it are tied up by rulings of purchasing departments and individuals who have not quite reached the full understanding that ALLIGATOR will work on



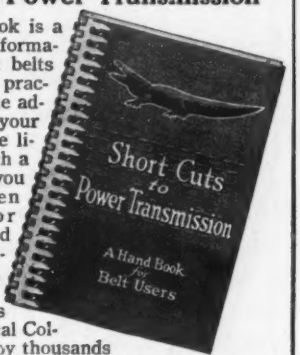
Nothing needed but a hammer to apply it—and you already have a hammer.

all belts from tape size, up to the giant conveyors with their crushing loads.

ALLIGATOR has been proven, indisputably, the most economical, practical and serviceable of all belt lacings. Many big belt makers have even gone on record as recommending it for their own belts to make certain of their products' lasting longer.

Write for Free Book—"Short Cuts to Power Transmission"

This book is a mine of information about belts and belt practice. A fine addition to your reference library. Such a book as you have often needed for simplified authoritative data. Now used in numbers of Technical Colleges and by thousands of engineers and practical belting men.



If specially interested in ALLIGATOR Steel Belt Lacing, fill out and mail form below.

Reg. U. S. Pat. Off.

Flexible Steel Lacing Co.
4619 Lexington St., Chicago
135 Finsbury Pavement, E. C., London

Flexible Steel Lacing Co.,
4619 Lexington Street., Chicago.

Gentlemen: Without obligation, kindly send me price lists and complete details on Alligator Steel Belt Lacing and indicate a convenient source of supply. Also send your book, "Short Cuts to Power Transmission."

Firm Name.....

Address.....

Name of Inquirer.....

Flexible as a Belt—Positive as a Gear
More Efficient Than Either

These twelve words tell the whole story about Link-Belt Silent Chain, the modern method of transmitting power.

Of all methods employed today in Textile Mills for the transmission of power, there is one which stands far above the others — Link-Belt Silent Chain. It has rightfully earned its reputation, "The Ideal Drive for Textile Machinery," because it combines in one drive the best points of leather belts and cut gears, minus their disadvantages. It is only reasonable, therefore, that a power transmitter having such qualifications should rapidly supersede these older forms of transmission.

Have you ever considered the use of this form of drive in connection with motors in your mill, or for replacing that troublesome leather or rubber belt drive which is being operated on centers too short for satisfactory service? Like many other mill operators you will find many places where it will pay to use Silent Chain when you know of its advantages.

Link-Belt Silent Chain Drives guarantee the efficient use of power—there can be no slip or loss of power. The Silent Chain Drive is positive under all conditions. It also means "Safety-first," because all moving parts can be fully enclosed in our patented oil-tight, dust-proof casings — an ideal condition in any mill.

Durability is combined with quietness and compactness. Constant shaft speeds are maintained under all conditions. The drive is 98.2% efficient on actual test.

Individual installations now include: Looms, Drawing Frames, Spinning Frames, Twisting Frames, Spoolers, Warpers, Winders, Cards, Fans, Lineshafts, Bobbin Strippers, Finisher Cards, Breaker Cards, Garnett Machines, Garnett Pickers, Grinders, Pumps, etc.

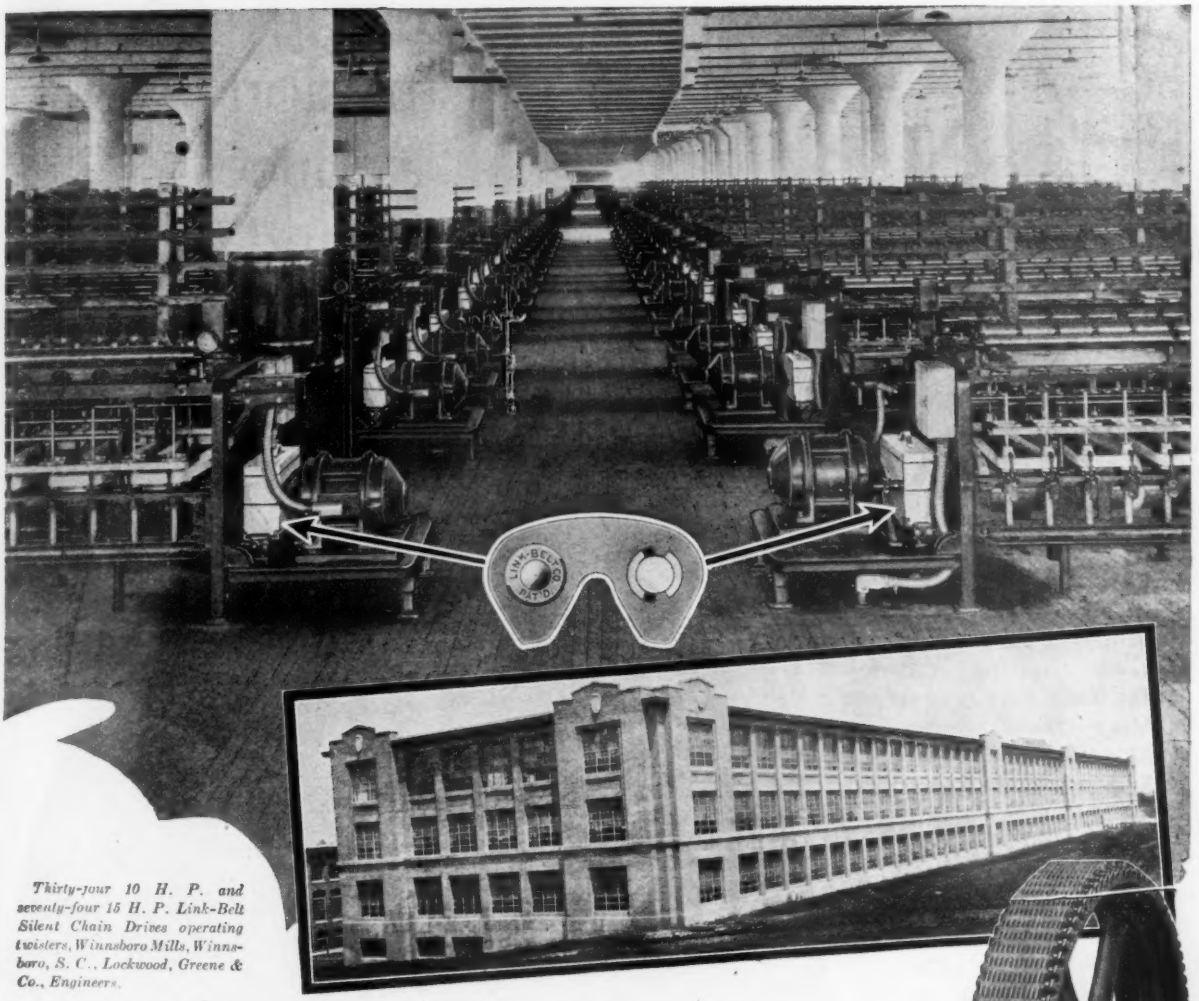
Briefly, the facts to be remembered about Link-Belt Silent Chain, are—

1—98.2% efficient (on actual test).
2—Convenience of location of driving parts.
3—Any reduction in speed is possible.
4—Uniformity of product.
5—Increase of production.
6—Economy of power.
7—Space saved.
8—Oftentimes lowers first cost of motors, on account of large reduction possible.
9—Not restricted to motor drives, but suitable, for instance, for driving from lineshaft to lineshaft.
10—Overloads taken care of without diminution of speed.

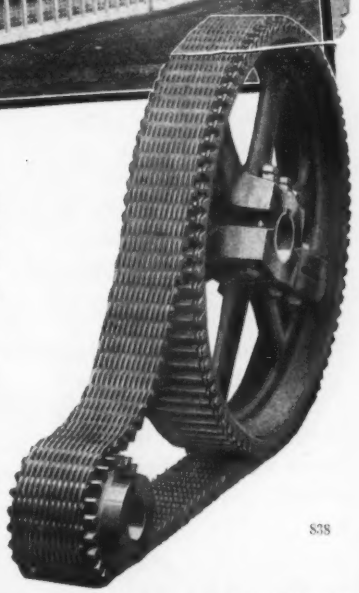
Send for one of our experienced engineers to study your conditions, and explain the results of various tests which have proved the superiorty of the Link-Belt Silent Chain. This is a service we are prepared to render without obligation on your part.

Send for Book No. 425, Link-Belt Silent Chain Drive for Textile Machinery.

LINK-BELT
SILENT CHAIN DRIVES



Thirty-four 10 H. P. and seventy-four 15 H. P. Link-Belt Silent Chain Drives operating twisters, Winnsboro Mills, Winnsboro, S. C., Lockwood, Greene & Co., Engineers.



THE Winnsboro Mills, Winnsboro, S. C., use Link-Belt Silent Chain Drives throughout all departments. Practically all equipment is individually driven with Link-Belt Silent Chain Drives—drawing frames, spinning frames, twisters, respoolers, spoolers, warpers, condensors, cards and fans. A total of over 250 Link-Belt Silent Chain Drives are used.

Note the clear overhead, good lighting, and compact, neat arrangement.

Link-Belt Silent Chain is the "Ideal Drive for Textile Machinery" and we will welcome the opportunity of proving it to you in your own mill, under your own conditions.

Send for Book No. 425

838

LINK-BELT COMPANY

PHILADELPHIA
BOSTON, 49 Federal St.

CHICAGO
CHARLOTTE, N. C., J. S. Cothran, Com'l. Bank Bldg.

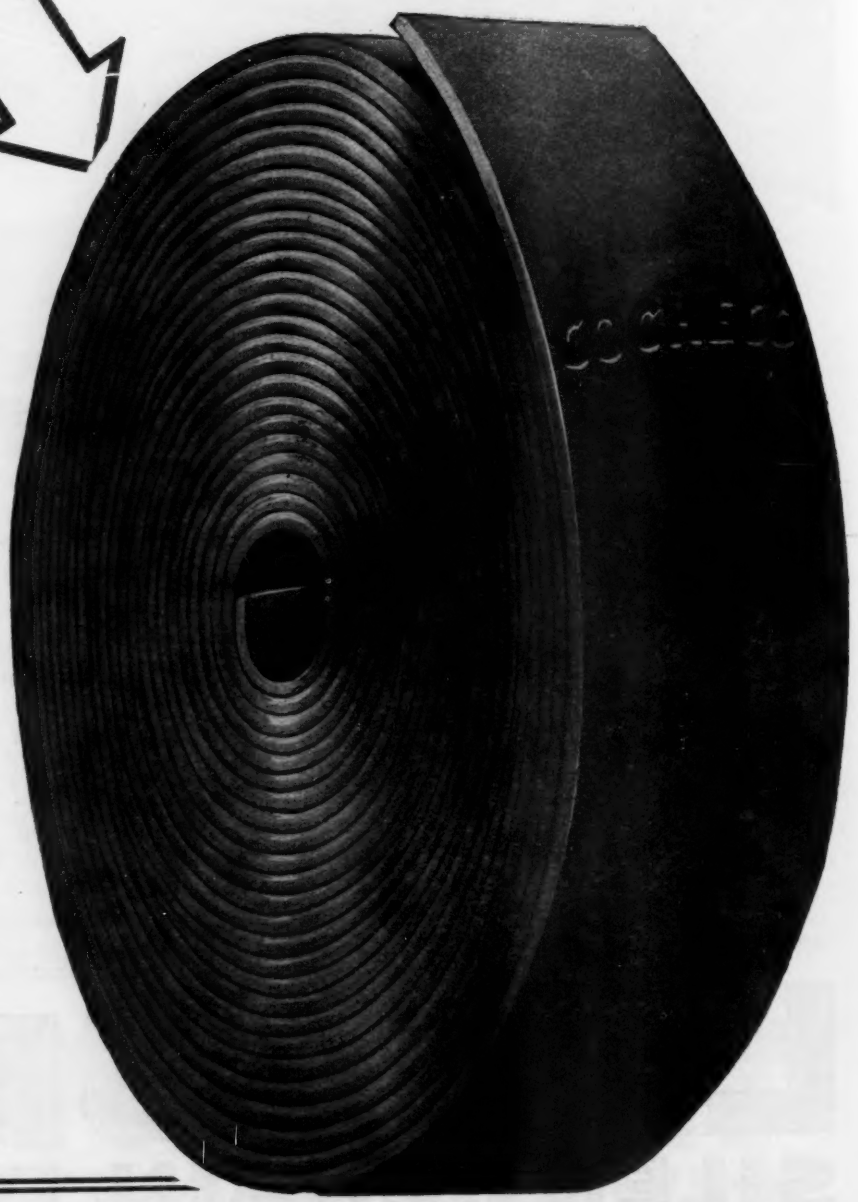
INDIANAPOLIS
BIRMINGHAM, S. L. Morrow, 720 Brown-Marx Bldg.

LINK-BELT
SILENT CHAIN DRIVES

COCHECO BELTING

Power Transmission Equipment that Reduces Costs of Operation and Upkeep

One of the surest ways to reduce production costs is to reduce the inevitable operating expenses to the minimum; to buy equipment of all kinds with more regard for future service than immediate expenditure.



Genuine oak tanned leather belting cut from backbone center stock gives service that cannot be duplicated by substitutes.

Cocheco Belting, manufactured by processes developed during 79 years of belt manufacturing experience outlasts the wheels on which it runs, the machines it drives. It's belt insurance of the most satisfactory sort.

Send for our belting booklets for details of Cocheco Belting and details of service records on all classes of work.

I. B. Williams & Sons

Dover New Hampshire

BOSTON, MASS., 157 Summer Street
NEW YORK, N. Y., 71-73 Murray Street
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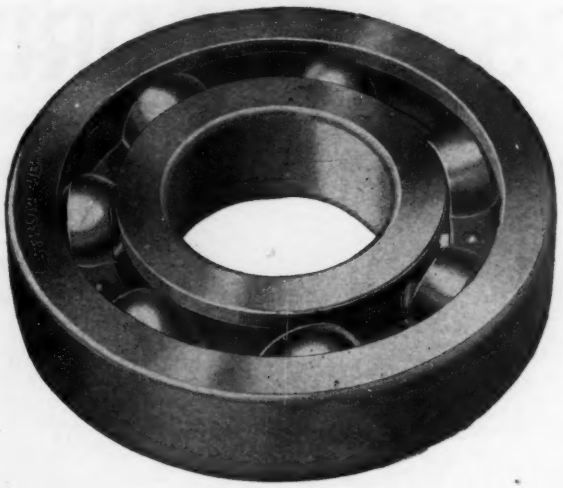


Strom Bearings assure uniform laps

The principal cause of uneven laps is the slipping of evener belts. This slippage is due to the belt having too much load to pull.

Strom Ball Bearings on the apron and evener rolls will lighten load.

Strom Ball Bearings will help the evener operate properly so that you get more uniform laps and lose fewer laps through over or under weight.

Strom Ball Bearings cost little to buy and even less to install.

For complete information get in touch with the Aldrich Machine Works, Greenwood, S. C.

U. S. BALL BEARING MFG. COMPANY

(Conrad Patent Licensee)

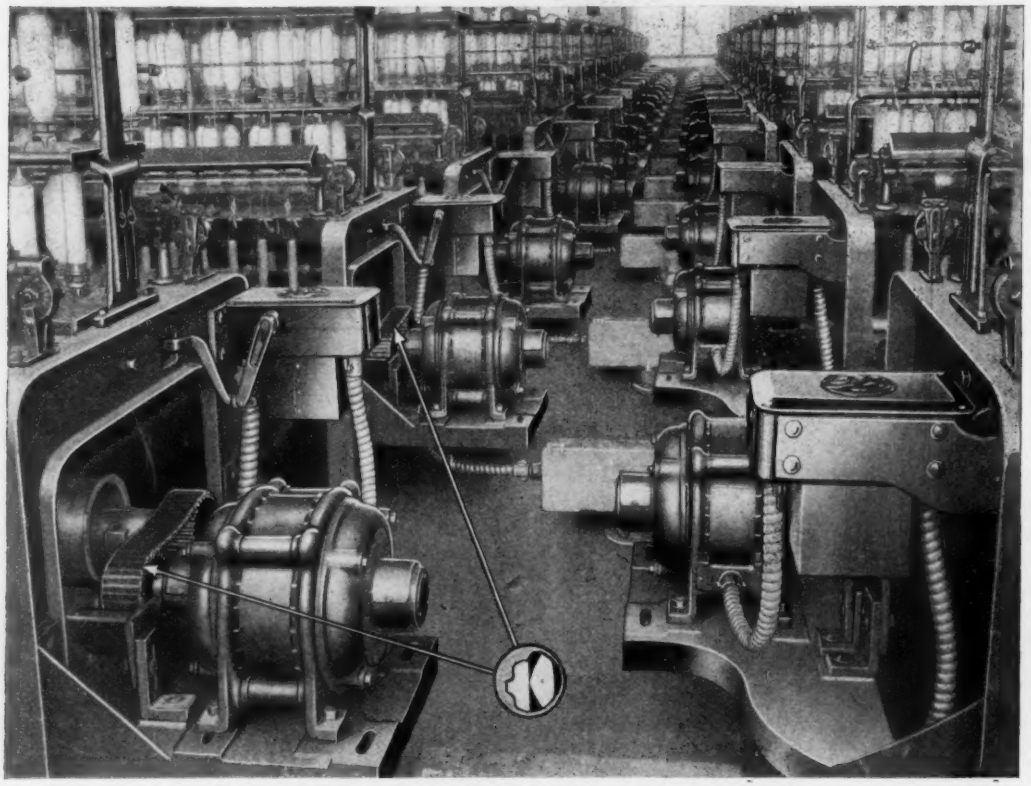
4544 *Palmer Street* - CHICAGO, ILLINOIS

Strom BEARINGS

173

MORSE SILENT CHAIN DRIVES

THE MORSE "ROCKER JOINT"



Efird Mill No. 4.

Installation made in 1916

In equipping No. 5 mill in 1920 Morse Chains were specified.

the following are the results being obtained:

(1) Higher and positive front roll speed.
(2) Uniform twist.
(3) Fewer ends down.
(4) Better lighting and decreased fire risk through elimination of belts.
(5) Decreased labor cost, one operator being able to handle more sides.

Write Today for Free Booklet
Benefit by Morse Service as others do.

MORSE CHAIN CO., ITHACA, N. Y.

LARGEST MANUFACTURERS OF SILENT CHAINS IN THE WORLD

Morse Engineering Service — *Assistance Without Obligation*

Address Nearest Office

ATLANTA, GA.....702 Candler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTON, MASS.....141 Milk St.
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Merchants L. & T. Bldg.
CLEVELAND, OHIO.....Engineers Bldg.
DETROIT, MICH.....Cor. 8th and Abbott Sts.
KANSAS CITY, MO.....Finance Bldg., Morse Engr. Co.
NEW YORK CITY.....50 Church St.
PHILADELPHIA, PA.....Fuller Bldg.
MINNEAPOLIS, MINN....413 So. 3rd St., Strong-Scott Mfg. Co.
PITTSBURGH, PA.....Westinghouse Bldg.
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MONTREAL.....St. Nicholas Bldg., Jones & Glasco, Reg'd
TORONTO.....Bank of Hamilton Bldg., Jones & Glasco, Reg'd
WINNIPEG, MAN.....Dufferin St., Strong-Scott Mfg. Co.

"Morse" is the Guarantee always Behind the Efficiency, Durability and Service

Established 1854 *Incorporated 1898*

THE A. & F. BROWN CO.

Engineers, Founders and Machinists—Power Transmission Specialists
Engineering and Sales Office, 79 Barclay Street, New York

Works
Elizabethport, N. J.

Stock Room in
New York City

To supply the demand for something better than the commercial material in this line; that is more durable, dependable and economical

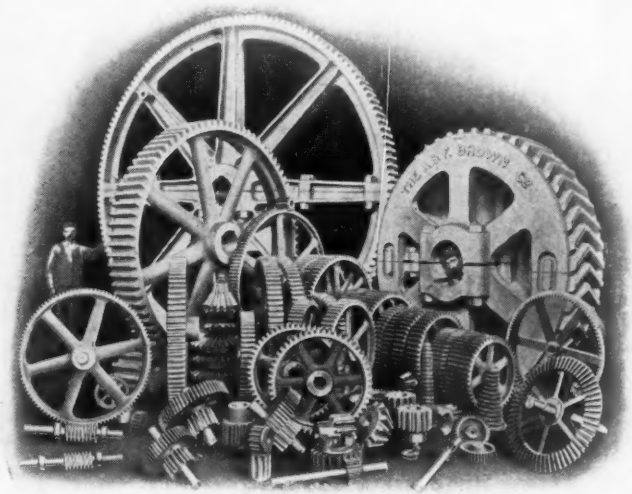
The A. & F. Brown Co. formerly designed and built special engines, special pumps and other special machinery.

One of their clients and customers (now one of the largest refining plants in the world) practically forced them into the designing and manufacturing of Power Transmission Specialties by commissioning them to further eliminate the expensive delays and stoppages in their continuous process by remedying the defects in the power transmission machinery which the owners later stated to have been **"the worst leak of all."**

This accomplished led to similar commissions from others.

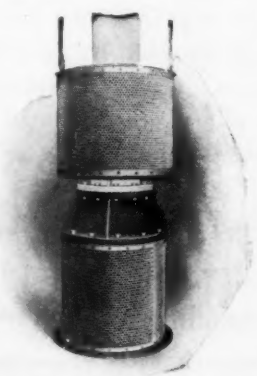
If you want the best we shall be pleased to serve you, but if you are looking for the cheapest you will buy the commercial material, quality of which is controlled by competitive prices.

The Original
Double Braced Adjustable Hanger with F. Brown's Patented Metallic Wick Self-oiler
(copied by many but never equaled)
This oiler will not clog or glaze and the freedom of feed maintains a film of oil between shaft and bearing. The shaft runs in oil. Many of these hangers have been in constant use for 30 to 40 years without rebabbitting and still in good condition. Where there is friction there is wear. When the wear is not appreciable there cannot be much friction.



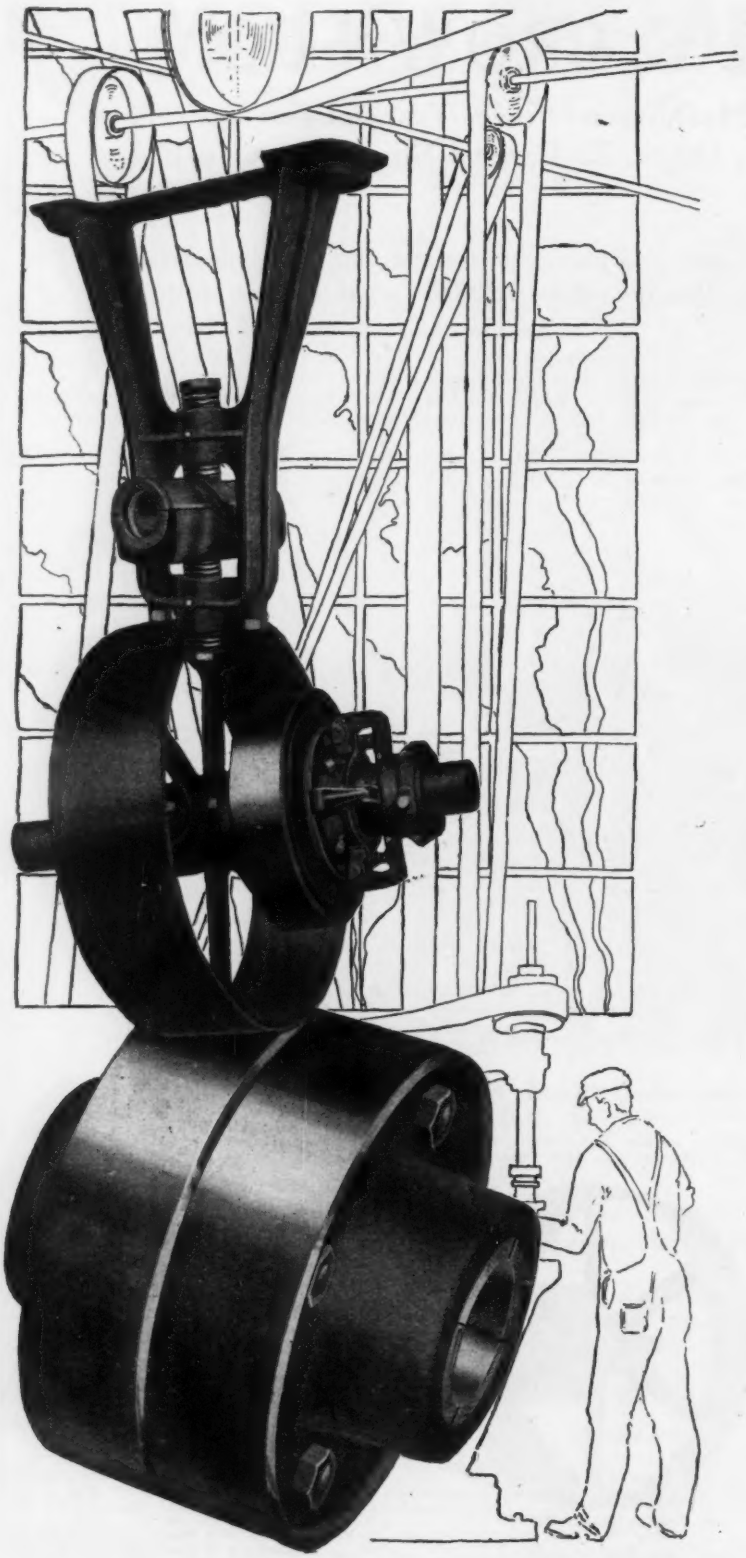
GEARS FOR MOTOR, MACHINE, MILL OR POWER PLANT
The gears shown in cut range from 16 ft. down to 3 in., the heaviest weighing 28,000 lbs.
Some are machine moulded, and others cut or planed and include steel, semi-steel, cast iron, bronze, rawhide, fibre, bakelite and condensite.

SIREN
Same as used on U. S. Navy vessels and army transports that carried our soldiers "over there."
Adopted and installed after competitive tests by the Committee of Safety," as an alarm in case of an aerial attack on New York City during the war.
By the U. S. and many foreign lighthouse departments as a fog signal.
By towns, oil refineries and large manufacturing plants as a fire and riot alarm.
Also made to operate by compressed air.
MADE IN FOUR SIZES.



Newman Patent Continuous Service Foot Valve.
No stoppage for cleaning. Outer screen is raised above surface to clean and lowered again. Circular scraper (on upper screen) cleans inner screen of any deposit accumulated while upper screen was raised.

Friction Clutch Pulley
(Our own patent)
Simple, **Durable,** Reliable.
There are several other Brown machinery manufacturers, who make clutches of different designs. If you will communicate with us we will tell you about this one.



TRANSMISSION APPLIANCES

Designed on Time-Tried Principles

In designing and selecting power transmission appliances, as in everything else, experience is the best teacher. We've been specializing on this class of service for 65 years. We know **which** appliances meet every condition to best advantage and **why.** Our transmission appliances are designed on time-tried principles and our engineers are well qualified to judge which of these principles applies to the solution of any new problem presented. Their services are freely at your disposal.

The T. B. WOOD SONS CO. Line is complete to the last detail and endorsed by its performances in every department of every class of mill.

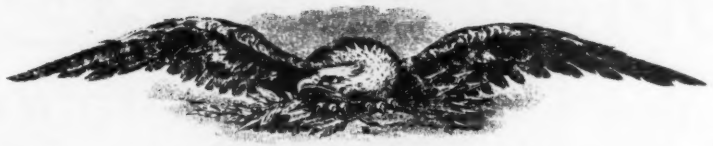
Details of whole line on request.

T. B. WOOD'S SONS CO.

CHAMBERSBURG, - PENN.

Milton G. Smith, Greenville, S. C., Southern Agent.

This Is Our War Record!



THE WAR DEPARTMENT OF THE UNITED STATES OF AMERICA

RECOGNIZES IN THIS AWARD FOR DISTINGUISHED SERVICE THE LOYALTY ENERGY AND EFFICIENCY IN THE PERFORMANCE OF THE WAR WORK BY WHICH

Sydnor Pump & Well Company

AIDED MATERIALLY IN OBTAINING VICTORY FOR THE ARMS OF THE UNITED STATES OF AMERICA IN THE WAR WITH THE IMPERIAL GERMAN GOVERNMENT AND THE IMPERIAL AND ROYAL AUSTRO-HUNGARIAN GOVERNMENT

SECRETARY OF WAR

ASSISTANT SECRETARY OF WAR
DIRECTOR OF MUNITIONS

This Is Our Cotton Mill Record

A PORTION OF WELLS DRILLED

Acme Hosiery Mills
Acme Spinning Co.
Adrian Mill
Alexander Mfg. Co.
Aurora Cotton Mills
Bellevue Mfg. Co.
Borden Mfg. Co.
Cannon Mfg. Co. (Several)
Caraleigh Mills Co.
Chadwick-Hoskins Co. (Several)
Clayton Cotton Mill
Cliffside Mills (Several)
Coolemee Cotton Mills
Crescent Spinning Co.
Durham Hosiery Mills
Efird Mfg. Co.
Erlanger Cotton Mill
Erwin Cotton Mills
Gibson Mfg. Co.
Greenville Cotton Mills, Inc.
Greenville Knitting Mills
Hadley-Peoples Mfg. Co.
Hannah Pickett Mills
W. E. Holt
L. Banks Holt Mfg. Co.
Icemorlee Cotton Mills Co.
Iceman Knitting Mill
King Cotton Mills Corp.
Liberty Cotton Mill Co.
Linford Mills, Inc.
Littleton Hosiery Mills
Lizzie Cotton Mills
McAden Mills
Marlboro Cotton Mills (Several)
Mays Mills, Inc.
Melrose Knitting Mill Co.
Minneola Mfg. Co.
Mooresville Cotton Mills
Odell Mfg. Co.
Patterson Mills Co. (Several)
Perfection Spinning Co.
Pickett Cotton Mills
Pilot Cotton Mills
Priscilla Spinning Co.
Proximity Mfg. Co. (Several)
Raleigh Hosiery Co.
Revolution Cotton Mills
Rex Spinning Co.
Rodman-Heath Cotton Mill
Rosemary Mfg. Co. (Several)
Saxon Mills
Selma Cotton Mills
Selma Hosiery Mills
Steele's Mills
Stehli & Co.
Sterling Spinning Co.
Virginia Cotton Mills
Wadesboro Cotton Mill Co.
Wateree Mills
Wennonah Cotton Mill Co.
Jas. N. Williamson & Sons Co.
Winnsboro Mills
Wiscassett Mills

WE CAN SOLVE ANY WATER PROBLEM

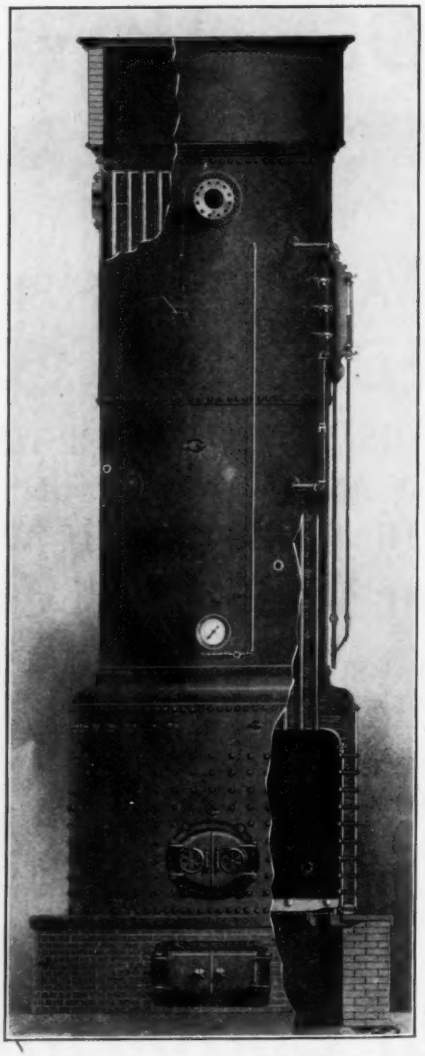
SYDNOR PUMP & WELL COMPANY

RICHMOND VIRGINIA

Established 1889

SYDNOR'S SUPREME SERVICE

30 Years Experience



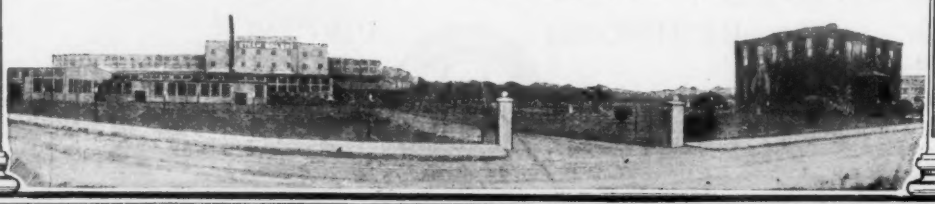
Manning Type Vertical Boiler
Adapted for Mill Work

INTERNATIONAL ENGINEERING WORKS, Inc.
FRAMINGHAM, MASS.

Southern Representative,
Isaac Hardeman, Charlotte, N. C.

BOSTON
PHILADELPHIA

NEW YORK
SAN FRANCISCO



TUPELO FLOORING IS—

TOUGH, with an "involved grain," therefore not affected by the hard knocks which a floor in factory, mill, warehouse or platform must expect.

UNDER FOOT, or "under wheel"—trucks included—a Tupelo floor grows smoother and solider with wear—*and tear.*

PUT down a new Tupelo floor, or replace an old "slivery" one—(of some other wood)—with Tupelo, and "that settles it" for all time.

EVERY factory, textile mill, warehouse or platform should be floored with *Tupelo "The Hard-Wear Lumber."*

LET us tell you why. You owe it to yourself to get posted on this natural-born "honest-to-goodness" flooring.

OF course, there will be no obligation on your part, if you ask. We want you to know all there is and then decide for yourself.

Please Address the Office Nearest You.

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION

805 Poydras Bldg., New Orleans, La., or 805 Graham Bldg., Jacksonville, Fla.

MILL WHITE PAINT

For Progressive Mills

BPS TRADE MARK REG.

Mill White will not yellow, flake off, or collect dirt. It may be washed like tile and withstands the vibration of the heaviest machinery.

Three Finishes
Flat, Eggshell and Gloss

Can be brushed or sprayed.

Manufactured by

The Patterson-Sargent Company

New York Cleveland Chicago St. Paul Kansas City

THE FUNCTIONS OF THE ENGINEER

SERVICE

To Foresee--Clearly
To Design--Correctly
To Build--Safely

These are the functions of the Engineer. Out of his surveys and examinations, the Engineer develops a clear picture of future requirements—be it in factory, mill, railway or any of the structures that serve man and industry.

Then, with clear vision, he designs to bridge the gap between the limitations of the present and the extensions of the future, building with tested and selected materials that the completed work may endure through the ages, contributing to the needs and benefits of successive generations.

One or more of these books may be of real interest to you. Write us which ones, and complimentary copies will reach you promptly.

"Factories for the Future"—on factory construction in general.

"Contentment Under Roof"—on industrial housing economies.

"Picks to the Minute"—on textile plants.

"Rivers in Harness"—hydro-electric development.

"Examinations and Industrial Surveys"—on the value and earning power of your plant.

J. E. Sirrine & Company

Engineers

Greenville
South Carolina

801 Insurance Bldg.
Dallas, Texas

Paints for All Industrial Needs

Banish the Gloom--Let in the Light!

On Textile Mill interiors—as in the conduct of business generally—a CHEERFUL TONE is essential now more than ever before.

Every aid that looks toward more sales, greater production, bigger profits, is necessary. YOUR prospects will be brighter if the interior of your mill is whiter.

Much of the daylight that is now going to waste can be transformed into useful, productive illumination by OJACO Mill White—benefiting your workers, your product and your business as a whole.

OLIVER JOHNSON & CO., INC., PROVIDENCE, R. I.
Paint Makers

TRADE OJACO MARK

MILL-WHITE

Distributor Service

ATLANTA, GA.
Cowles & Bleckley

BOSTON, MASS.
Lewis E. Tracy Co.

BUFFALO, N. Y.
Dwelle-Kaiser Co.

CHARLOTTE, N. C.
Charlotte Supply Co.

FALL RIVER, MASS.
Wm. F. Harticon

FITCHBURG, MASS.
B. A. Cook Co.

PORTLAND, ME.
M. F. Bragdon Paint Co.

ROCHESTER, N. Y.
F. P. Van Hosen Co.

SYRACUSE, N. Y.
Alexander Grant's Sons & Co.

UTICA, N. Y.
American Hard Wall Plaster Co.

WOONSOCKET, R. I.
J. B. Farnum Co.

Consult the OJACO distributor nearest you. Upon request, he will send one of his men to explain how OJACO Mill White will make your walls and ceilings worth-while assets instead of costly liabilities.

Von Duprin

Self-Releasing Fire Exit Latches

MAINTENANCE

Von Duprin latches are so well made that the first cost cannot be low.

Yet over a period of several years the cost is negligible, for the maintenance cost—the important factor—is practically nothing.

The almost complete elimination of replacement expense is brought about by the balance and weight of the devices, the precision of manufacture, the special wear-resisting features, the simplicity of interior construction, and the new mortise locks, with many important parts cast integral with the case, and with the latch-bolts enclosed in close-fitting housings.

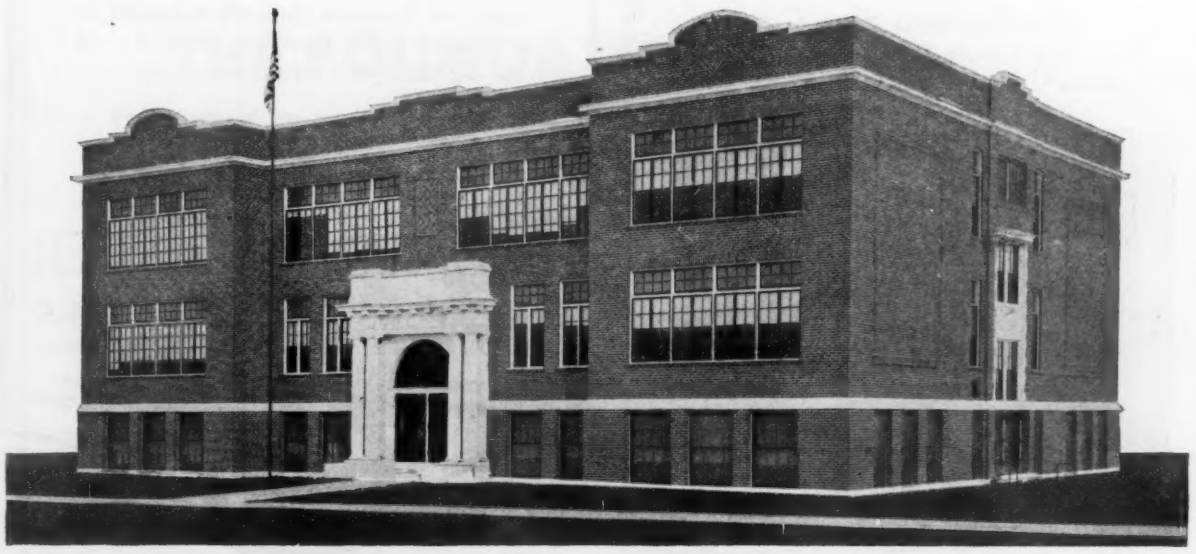
The result of such careful design and manufacturing is shown by the record in one city, where more than 600 sets of **Von Duprins** are used on school house doors—and the total cost for replacement parts has been less than $1.00. Many of these **Von Duprins** are of old types which have been in use more than 13 years, and do not have the late improvements.

Von Duprin latches give safety at small expense. Let us send you catalog 12-T, and the interesting booklet, "Saving Lives."

Specify—
Von Duprin
Self - Releasing Fire Exit Latches, as approved by the Underwriters' Laboratories (Inc.) Of the National Board of Fire Underwriters:
Report No. S. A. 163; Guide No. 100-F 24.

Teller Grade School, Denver, Colo. George H. Williamson, Denver, Architect. Julius B. Kaer, Denver, Contractors.

VONNEGUT HARDWARE CO.
Indianapolis, Ind.



Reinforced Slag Concrete buildings erected for the Peerless Cotton Mills of Thomaston, Ga. Algernon Blair (Montgomery), contractor.

CONCRETE

for better buildings

for better concrete

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

Experiments have indicated—and experience has proved—that Slag Concrete ranks highest both in strength and wear tests.

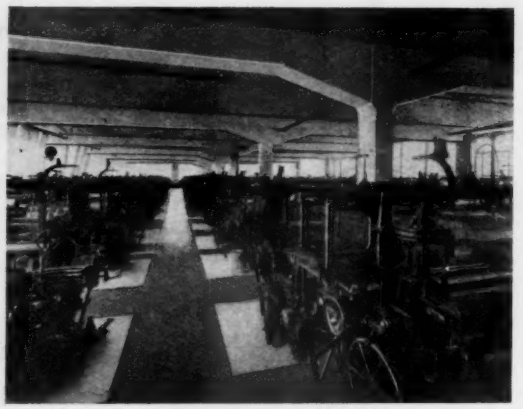
Slag Concrete mill buildings get stronger as they grow older. That's why Slag Concrete is now so generally employed in modern industrial construction.

Birmingham Slag Co.

Slag Headquarters for the South

Atlanta BIRMINGHAM Thomasville

Photo shows resilient (slag) mastic floors in new Slag Concrete weave shed erected for Columbus Mnfg. Co. of Columbus, Ga., by T. C. Thompson Bros. & Co. (Charlotte, N. C.)



Interior of B. Edmund David, Inc., Factory at Wilkes-Barre, Pa., 64 feet wide with only Single row of Columns.

Possession in only 53 Working Days

Cellar excavated from solid rock
2-Story Concrete Building, 158 x 64 feet
No night work—little overtime
Cost to owner 4% less than estimated

ON April 1, 1921, after considering competitive bids, B. Edmund David, Inc., awarded us a contract to design and construct a factory on a fixed fee basis. Possession of the new building was required not later than August 1, 1921, the day the lease on the old factory of B. Edmund David, Inc., expired.

Two and a half months after our contract was signed looms were installed in the new factory—June 15, 1921.

While our paramount purpose was speed, at the same time we managed to economize. We saved our client 4% of the estimated cost on the entire job.

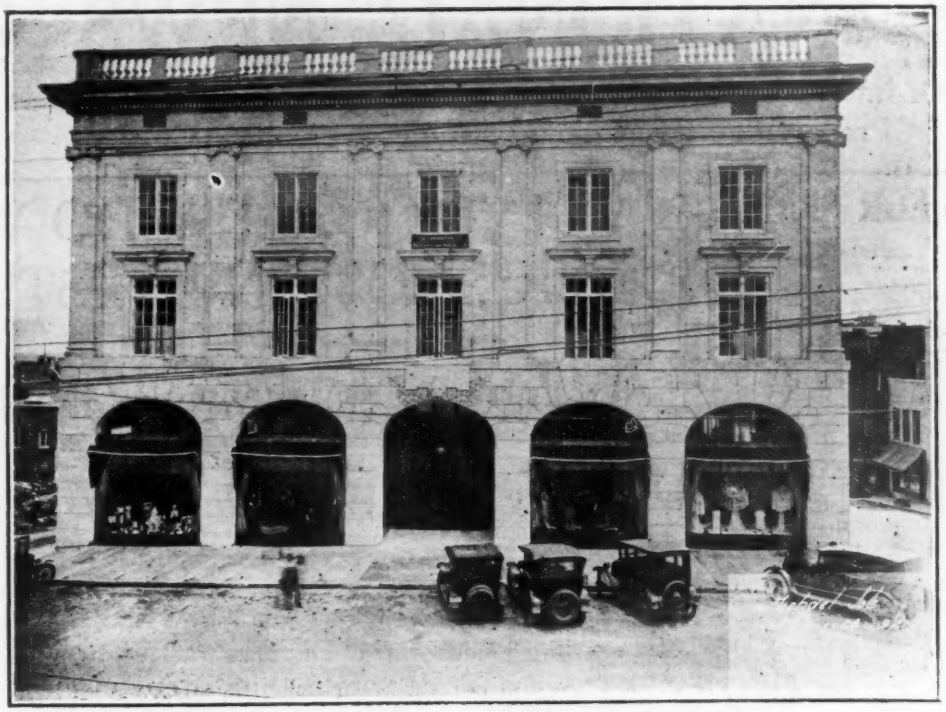
Note: Mr. Binger will be glad to call on you during his next trip in your section, or if your problem is urgent, he will arrange to call at once.

THOMPSON & BINGER
INC.
ENGINEERS & CONTRACTORS
CONSULTATION - DESIGN - CONSTRUCTION

NEW YORK
280 MADISON AVE.

SYRACUSE
GURNEY BUILDING

CONCRETE



MICHAEL DEPARTMENT STORE, ATHENS, GEORGIA.
HENTZ, REID & ADLER, ARCHITECTS, ATLANTA, GA.

This building was constructed in record time by one of our experienced organizations to the entire satisfaction of the owners and architects.

THE FOUNDATION COMPANY

ATLANTA

NEW YORK	SAN FRANCISCO	MONTREAL, CANADA
NEW ORLEANS	LOS ANGELES	PARIS, FRANCE
CHICAGO	PHOENIX	LIMA, PERU
PITTSBURGH	PORTLAND, ORE.	HAVANA CUBA
DETROIT	VANCOUVER, B. C.	TAMPICO, MEXICO

BUILDERS OF **SUPERSTRUCTURES** AS WELL AS **SUBSTRUCTURES**

"NATIONAL" NEWS

Of interest to Dyers and the Color Using Industries in General
Prepared by the National Aniline & Chemical Co., Inc.

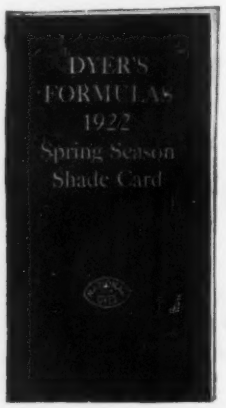
COLORS FOR SPRING

The "National" Announces New Issue of Dyer's Formulas

FOR 1922 SPRING SEASON

Dyers of silk, cotton and wool will find of great practical value our booklet of Dyer's Formulas that has just come from the press. The recipes have been prepared by "National" research colorists for matching the shades in the 1922 Spring Season Shade Card, issued by The Textile Color Card Association.

It is the aim of the "National" to exercise such care in the choice of the dyes recommended as to insure to dyers following recommendations made, the highest degree of favorable results.



Formulas are given for the use of "National" Dyes in reproducing on cotton, silk and wool the fifty-six evening shades, ten hosiery colors and the five shades carried over from last season, as well as formulas for the fourteen special woolen colors.

The matching of shades on any material, co-operative effort in solving problems, and the supplying of special technical data on the application of dye-stuffs, are important features of "National" Service.

This group of Dyer's Formulas serves a practical purpose and meets a present need. If you have not already received a copy, write to our nearest branch office, which will be glad to supply you.

WHAT QUALITY DO YOU DESIRE MOST IN DYESTUFFS?

Uniformity, Shipment by Shipment?

Very Well, Here It Is!

The "National's" method of Standardizing every step in the manufacture of dyes, commencing with the initial raw material, checking and cross-checking under the control of a trained inspection service, insures that the final product shall always be of a scientifically fixed quality.

STOCKS AT CHARLOTTE

For Convenience of Southern Cotton Mills

Prompt delivery is one reason for the popularity among Southern cotton mills of

NATIONAL Indigo NAC 20 % Paste
NATIONAL Sulfur Black BG Extra Conc.
NATIONAL Erie Black GXOO
NATIONAL Sulfindone Blue B Conc.

Ample stocks of the above and of the entire National line of dyes for cotton are carried at our Charlotte, N. C., warehouse in the heart of the Cotton Mill district.

BLACK

Is One of the Spring Fashion Colors

In no instance is the method of standardization used by the National Aniline & Chemical Co., Inc., more fully demonstrated than in the production of

National Erie Black GXOO

Next to indigo this is one of the most widely used dyestuffs and it is essential that every delivery shall be up to the Company's well-known standard.

Product samples, together with practical dyeings, accompanied by full information, will be supplied to all inquirers upon request.

National Aniline & Chemical Company, Inc.

MAIN OFFICE
21 Burling Slip, New York City

Boston	113 High St.
Charlotte	236 W. First St.
Chicago	111 W. Washington St.
Hartford	209 State St.
Montreal	8 Place Youville
Philadelphia	653 N. Broad St.
Providence	28 N. Main St.
San Francisco	120 Second St.
Toronto	14 Front St., East

THE FIRST AND LARGEST MAKERS OF COAL-TAR DYES IN AMERICA

NATIONAL DYES

COTTON

Published Monthly by

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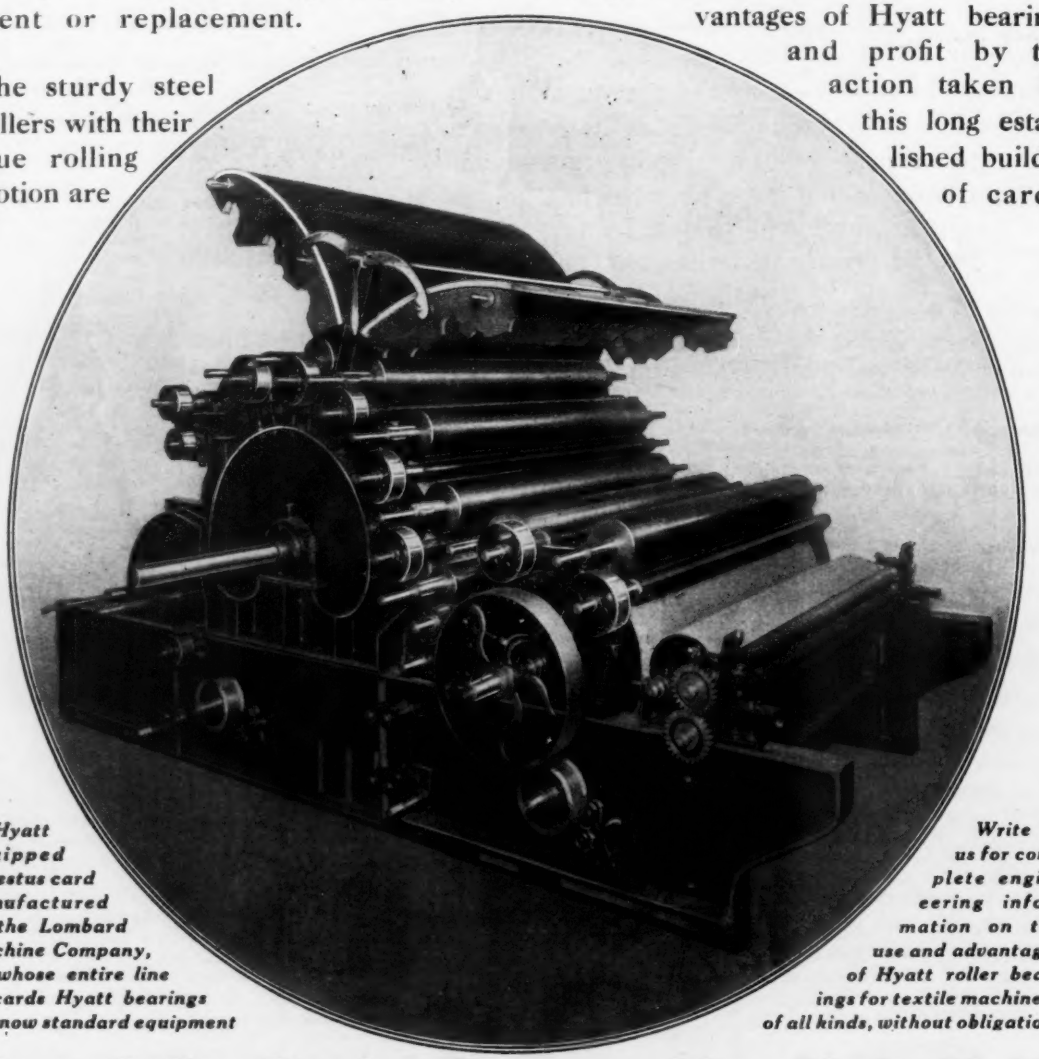

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The Alibi Shooter.

There are two things in this world that give me a pain, fried onions and alibis. But of the two evils give me fried onions. I can eat fried onions on the 4th day of July and practically cease to taste them by Christmas. But the after effects of an alibi stay with me for a full year.

I hold this truth to be self-evident, that the better the alibi the flatter the failure. An alibi is a piece of dough which started out to be a biscuit and ended as a pancake. The alibi is intended by its fond parent to be an explanation, but it is really nothing but an admission.

An alibi is a worthless substitute for an achievement. The world is roughly divided into two classes: those who use alibis, and those who get the thing done. A college education is a wonderful help to the alibi shooter, because with figures, book learning, and some adroitness in the use of language, it is possible to prove almost anything to have been impossible.

It is remarkable how expert an alibi shooter becomes. At first he tries one single little alibi to save him from the consequences of a failure. It works. The thing seems so easy that the next day he finds himself shooting two alibis to explain two failures. The number increases to three, four, and five. The thing becomes a passion. Eventually all the skill, energy, and ability of the individual is directed toward the making of ingenious excuses.

Most men make good because they know if they don't they are going to be S. O. L. Those persons who were not in the army will find the definition of this terse and expressive idiom on page 473 of this magazine.

The dark shadow of the sheriff has made more successful business men than the lure of the Rolls-Royce. When the bill collector is after you with a six-shooter in each hand, and you are leaping lightly from crag to crag like the shapely chamois, if you are truly wise you keep on leaping, nor stop to think up a reason why not. The fellows who get plugged always drop into oblivion in the chasm below clutching a strong alibi. But it doesn't bring them back.

You all know the alibi shooter. You meet him every day. He is the clerk whom you send across the street for a couple of ten-cent cigars, who comes back with a package of bird-seed, and then explains that he did not go out himself personally, but sent someone else because it was raining, and the other fellow misunderstood him.

He is the man who has a luncheon engagement with you at 12:30 and blows in at 1:15 all out of breath, but not out of excuses.

He is the salesman who requires twelve full sheets of hotel stationery to write you a weather report and an essay on "conditions."

He is the man in the service station who promises to have your car ready at five o'clock.

He is the chap who is due back from his two weeks' vacation on Monday morning and wires you Tuesday noon, "Missed the train. Will return tomorrow."

He is the man who is never quite ready to do what you want, or give you what you want, now—the man whose daily life, year after year, is a series of promises. His shibboleth is, "The first thing in the morning." He forgets that he may be dead "the first thing in the morning."

The alibi shooter eventually arrives at that mental state where he begins his alibi before he begins his attempt. When you give him an assignment he is careful to mention all of the difficulties. With a task set before him his mind instantly commences the manufacture of good excuses which he can offer in case of failure to put the thing over. Unconsciously from that moment he shapes his course toward failure instead of toward success.

When the allied armies were turned over under the single command of General Foch, they were beaten armies. Germany, in a technical sense, had won the war. General Foch could have availed himself of a thousand good excuses, made to his hand. He could have lost the war, and spent the remainder of his life writing books to prove that he couldn't help it.

But he was that kind of man who shoots bullets and not alibis. So civilization won.

The motto of the city of Chicago is *"I Will!"* That motto made a metropolis out of a mudhole.

Far better to try, and die, than to lie, and sigh. Explanations never do any good. One's friends don't need them; one's enemies won't believe them. The world at large doesn't give a damn.

Procrastination is usually the besetting weakness of the alibi shooter. The man who never does anything *now* is more than lazy; he is *afraid.*

Failures inspire pity, seldom admiration.

The streets of the City of Failure are paved with alibis—some of which are absolutely perfect.

Look into the heart of the world today and what yearning do you find there? Listen to the voice of the world today, and what is it crying?

From gilded dome, from silvered minaret, from cloud-capped mountain peak, to him who hath ears to hear, the Voice is calling:

"We want men! Men who *do.* Men who won't stop to ask why or argue. Men who can take a command or *the* command. Men who will bring back results dead or alive—not alibis!"

The reason there's so much more room at the top is that the *crowd* is all at the *bottom.*

Every one of them can give you fifty good alibis.

The truth is, the crowd is there *because they like it.*

They fear the fierce white light that beats upon the high places.

The man who gets ahead uses his head, not to explain why it can't be done, but to *figure out a way to do it.*

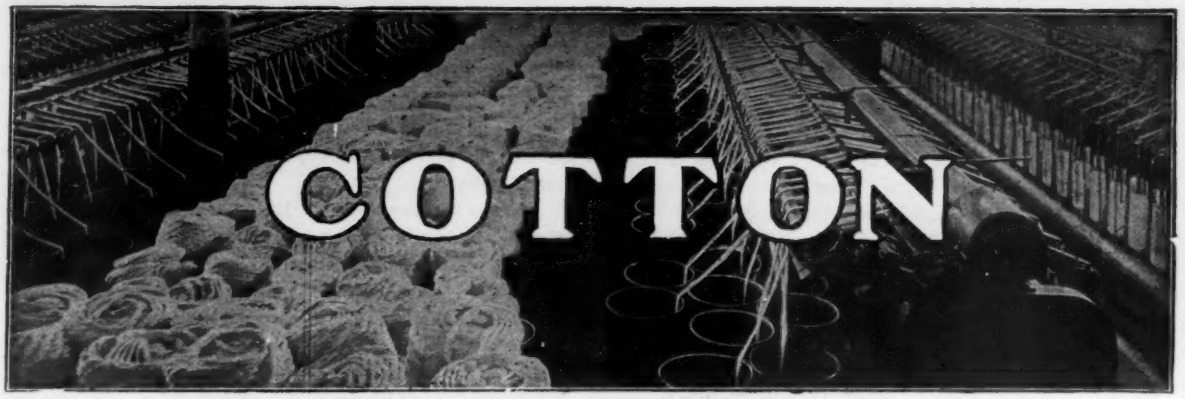
All things come to him who does *not wait.*—Harry Earnshaw, in the *American Mutual Magazine* for December.

AMONG COTTON'S READERS

R. E. Barnwell, Resident Director,
Lockwood, Greene & Co., Engineers,
Atlanta, Georgia.

"As a medium for presenting to and keeping before all those interested that which is helpful and instructive in this great textile industry, your publication, COTTON, is unexcelled. May it have many successful years."

R. E. Barnwell



January, Nineteen-Twenty-Two

A New Species of Flimflam.

The New Year finds Congress submerged, apparently as deeply as ever, in the tides of tax and tariff revision. Somehow, it seems as though little real progress has been made during the year that has passed. True, a revision of the internal revenue taxation was written into law after many months of legislative effort. But now Congress finds itself confronted by the prospect of tackling this task anew in the continued demand for a sales tax system.

The new proposal—it is really an old one—is intended to make possible the soldiers' bonus which has been promised by the politicians ever since the Armistice. The bonus would have bankrupted the treasury under the old-fashioned system of taxation. Besides this, it ran counter to the popular demand for a lessened burden of government taxes. The same politicians who had promised the bonus had also promised to revise the tax laws downward. Apparently, however, the politicians believe that if they can raise the bonus tax by some new process, that the American people will not add their two tax bills together and discover that they are paying a heavier charge than they have ever paid before.

There is also more than a suspicion that some of the chief propagandists of the sales tax in the two houses of Congress are willing to support the soldiers' bonus if only for the purpose of getting an opportunity to try out the new tax system from which they expect so much. Their arguments are much the same as those advanced by the supporters of the income tax system twenty years ago. At that time, the income tax proponents saw in their system a simple direct method that would relieve the nation from an assorted lot of irritating special taxes. It took an amendment to the Constitution to make the income tax finally possible. By the time this was accomplished, the national government's demand for money had grown so heavily that they not only absorbed all that the income taxes could reasonably produce but required the maintenance of most of the special taxes as well.

It may easily be that the sales tax proponents will have the same experience. When they finally get their sales tax on the statute books, they are likely to find that the demands for government aid for this or that enterprise, the demands for federal funds to maintain the increasingly complicated machinery of the government will have grown to such an extent that they will absorb all the money that can be raised from the burdened taxpayers by the combined operation of income taxes, sales taxes, customs taxes, and the usual assortment of special internal revenue taxes.

President Harding was careful, in his annual address to Congress, not to take up the sales tax problem. But official spokesmen for the administration have indicated from time to time that the White House has no objection to the sales tax idea and that it sees in that proposal a progressive method to solve the nation's financial needs.

The President, however, did take occasion to give impetus to the tariff revision on which Congress has now been at work for more than a year. For the Republican members of the Ways and Means committee of the House of Representatives who were re-elected in November, 1920, began work at once on the new tariff schedules, without waiting for the formal convocation of the 67th Congress in April, 1921. But there have been many snags. Rewriting the tariff law in times of international stress like these is a tedious and a difficult process. To protect American industry against the competition of nations whose money has degenerated into mere "scraps of paper" requires something more than the usual form of increased tariff duties.

To meet this, the Republican majority in the House of Representatives framed the American valuation plan and after spending all Spring and most of the Summer on a set of tariff schedules, sent the Fordney tariff bill to the Senate.

There that bill still remains. The Senate Finance committee side-tracked it to hurry the tax revision bill. Then it side-tracked it for the consideration of the bill to refund the foreign war loans of the United States. Then it side-tracked it again for vacation purposes. The committee has shown anything but eagerness to tackle the difficulties of the problem.

In the meantime, there has been a nation-wide propaganda against the American valuation policy. This propaganda seems to have made considerable impression. It was at least sufficiently strong to prevent the President from giving a 100 per cent endorsement of the policy in his message. The President did, however, recommend an increase of powers to the Executive to levy increased duties to meet the kaleidoscopic fluctuations of foreign exchange, and the American valuation proponents are making the best of the President's recommendation for a limited application of their plan. They have not given up hope, however,

of inducing the senate to accept the House proposals confident that the President will not veto such a bill.

The President's proposal that the Executive be given authority on the advice of the Tariff Commission to proclaim increased tariff duties when necessitated by international conditions, raises again the question of the constitutional authority. The Constitution is strict in its conferring of the tariff-making powers upon Congress. How far Congress can delegate this authority, either to the Executive or to some other governmental organization, is a grave question. It is one that would be certain to be carried into the courts the moment its application were undertaken. It is a feature of tariff making that has often deterred Congress from attempting to give more flexibility to its schedules. It also has given Congress a cloak behind which it could hide its natural jealousy of Congressional powers. Congress does not like to turn over to the President any of the authorities which it holds. The right—and the duty—to prescribe customs is an important function of the legislative department. It is a vital section of Congressional power. Once Congress has abdicated that right, even in a slight degree, the legislative department will have lost a portion of its prestige and its strength.

In the meantime, the Senate Finance committee is holding hearings, not only on the American valuation idea but on the individual schedules of this complicated bill. It is difficult to get prophecies that are worth anything concerning its prospect. There is little hope for a settlement before April and it seems likely that the President will not have an opportunity to sign a permanent Penrose-Fordney tariff law before May, and maybe June.

There are plenty of complications in the way. To start with, the Senate has revealed no exuberant eagerness to finish its tariff task. It is hard to arouse any enthusiasm over a subject so dry, especially when no leader seems willing to undertake the charting of a definite course. The President's unwillingness to make definite and specific recommendations is reflected by the attitude of the Republican leaders in the Senate. The Democrats are ready to make the course of the bill as troublesome as possible. Besides this, there is the "agricultural bloc" which has supplanted much of the leadership in the Senate and which will attempt to dictate the course of the tariff bill. Although the majority of the members of the bloc are Republicans, they have little respect for the Republican party requirements and they are not looked upon as an aid to Republican legislation.

As if this were not enough, the Senate will find ample opportunities for further delays in the debates which are sure to grow out of the results of the Arms Conference. The treaties which were framed in that conference require Senatorial ratification. The opponents of the treaties are likely to make up whatever they lack in numbers by the vigor of their fighting. In the battle over the League of Nations a minority of irreconcilables fought long enough to reject the treaty of Versailles. That form of Senatorial fighting entails inevitable delays for the whole legislative calendar. The Senate also must devote much much of its time to appropriation bills so that the tariff measure will have to give way to that.

The tariff fight will also renew the controversy over the dye embargo act. This is now carried in the emergency tariff law but its proponents will make every effort to accept it as part of the permanent tariff measure. The House of Representatives refused to do so. The Senate has already ordered an investigation of the "dye trust" and the revelations that are expected will add to the delays in the tariff fight.

And in the meantime the Dillingham immigration limitation act is soon due to expire and no suitable substitute is yet in sight to protect our shores from the impending flood of peoples from abroad, many of whom will be of a class suitable to swell the "Amazon army" which is making trouble in the Kansas mine districts as this is written.

Sixty-Six to Eleven.

The first concrete development in Secretary Hoover's campaign for standardization was concluded on November 15th at a conference in Washington which was attended by representatives of the National Paving Brick Manufacturers' Association, members of the affiliated engineering associations and representatives of the several government departments interested.

The conference resulted in the mutual consent to recommend the elimination of fifty-five out of sixty-six varieties of paving brick listed in the report of the National Association on paving brick varieties, and also paved the way to a more complete understanding between the manufacturers and the engineers who specify their material.

In addressing this conference Secretary Hoover concisely outlined the Department's intentions in the following words:

"I think engineers, of whom I have long been one, have been united in the feeling that there is a great area of waste in American industry that can only find correction at the hands of the manufacturers, and can only find it in a purely voluntary action on their part. We are, in a broad sense, confronted with a great many economic difficulties—the necessity to maintain a high wage level, the consequent necessity to reduce all processes of manufacture to the lowest possible costs, and the complete compulsion that we should eliminate every possible waste of industry itself. There is one thing that stands out about American industry that comes up daily to the Department, and that is the remarkable efficiency of the individual industry and the very considerable inefficiency of collective industry. If we had the same native efficiency collectively in this country that we have individually, we would have no difficulty in maintaining our own in foreign or international commerce, of maintaining the high wage levels and the high standards of living, and it is only by virtue of some prompt action that we can hope to secure some fundamental readjustments that the country must have.

"During the war, the necessity for the elimination of unnecessary employment, the elimination of the use of unnecessary materials, benefited many industries. There grew up a far different cooperation in industry in the simplification of a great many processes and products. The experience gained at that time, I think, convinced most manufacturers that there was something of permanent value in those ideas. There has been an attempt on the part of manufacturers since then in a hundred different directions to come to an agreement and conclusion for

(*Continued on page* 150.)

Cotton Mill Lighting*

BY JAMES M. KETCH.†

Industrial leaders are realizing as never before, the value of standard electrical apparatus, supplies, machinery and manufacturing processes. Textile machinery manufacturers were among the first to appreciate the value of standardization, and for years the machines for certain cotton working operations made by different manufacturers have been almost uniform in size, speed, and method of driving. This uniformity naturally led the cotton mill architects and engineers to group the machines in a standard arrangement, and later to design standard mill buildings. The substitution of reinforced concrete and steel for brick and wood in mill buildings, has not materially changed these standard machine groupings. The larger floor slabs and spans possible in concrete and steel buildings have removed the necessity for the multiplicity of columns characteristic of the older brick buildings with wood floors.

In contrast to the commendable standardization of cotton mill buildings and machinery arrangement, there has been little attention given until recently to the possibilities of standardization in lighting; that is, as regards levels of illumination, arrangements of lighting units, and the adoption of standard reflectors and lamps. Because progress in lamp manufacture preceded the development of suitable reflectors, explains the temporary dissatisfaction with the highly efficient Mazda C or gas-filled lamps. These lamps which should have been welcomed with open arms because of the greater lighting economy they made possible, were condemned on brightness and glare for the lack of efficient shielding and reflecting equipment. With the reflectors available at that time, there seemed to be only three solutions to the lighting problem—to use the old shallow dome which caused glare when used with Mazda C lamps, or the deep bowl which while eliminating direct glare had other disadvantages, or discard entirely the Mazda C lamps for smaller wattage Mazda B or vacuum lamps having a lower filament brightness, and unfortunately, a lower efficiency.

In time the reflector manufacturers developed lighting units which effectively combined glare protection and economy in such a way that the safe use of Mazda C lamps became possible. Undoubtedly the most important steps facilitating standardization in lighting has been the recent development of the bowl-enameled Mazda C lamp and the RLM (Reflector and Lamp Manufacturers) standard dome. This reflector and lamp combination has created possibilities of standardized cotton mill lighting never before realized.

The purpose of this paper is to explain the requirements of modern textile illumination, how to get good illumination and maintain it, and to show some standard solutions of the more important cotton mill lighting problems.

Requirements of Good Illumination.

Foot-Candles of Illumination.—The most important requirements of an illumination system—that thing for which it is installed and maintained—is the quantity of useful light, or the foot-candles of illumination on the work. An industrial illumination system should not be judged by the wattage expended, nor by the brightness visible when looking at the lighting unit—it should be judged upon its ability to efficiently direct light onto the work, and to furnish glare-protected, shadow-softened foot-candles of illumination.

There has been recently developed a handy portable foot-candle meter, Fig. 1, with which the illumination at the work, in terms of foot-candles, is measured as easily

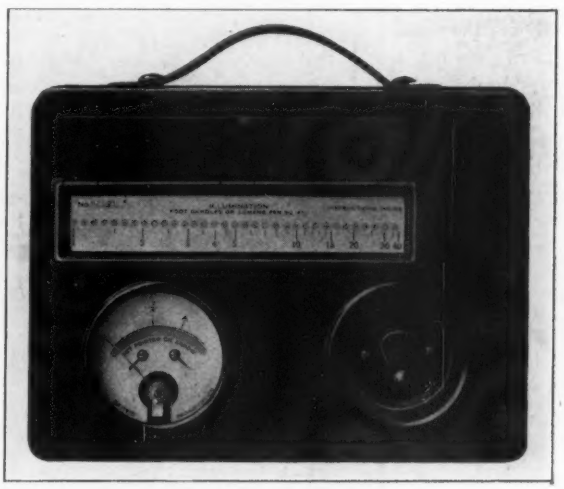


FIG. 1. FOOT-CANDLE METER.

as a bale of cotton is weighed with ordinary scales. This instrument is used by engineers, architects, and mill operators to keep a check on the illumination in the same manner a thermometer is used to check the temperature of a starch vat. With the advent of the foot-candle meter, engineers and mill operators learned to think in terms of the *results* of an illumination system rather than the *expenditures of wattage,* and it is a very logical basis since the same expenditure of wattage in two lighting systems may produce two very different results in foot-candles of illumination at the work. The resultant illumination depends upon the type of reflectors and lamps used, as well as on the wattage of the lamps.

The modern procedure in designing an illumination system is to start with the *effect* first, and assuming that a certain foot-candle level of illumination is needed for the operation, work back to the cause, the lighting unit, to determine the most economical spacing, and type of lamps and reflectors to produce the foot-candles required. The illumination problem should receive the same consideration as a power problem, which is now figured from effect to cause,—from yards per day to power required,—rather than by assuming that there is a definite amount of power available which must be equally divided between machines.

Individual engineers and architects who design cotton mills and illumination systems have standardized on levels of illumination which conform very closely to those recom-

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†District Illuminating Engineer, National Lamp Works.

mended in some of the recent state lighting codes. Those levels which have been adopted by some of the more prominent cotton mill engineers and architects are shown in Table 1.

TABLE I.

FOOT-CANDLES.

Engineering Firm	Opening Picking Carding Dyeing Lapping	Drawing Roving Speeders Slubbers	Spinning Twisting Warping Beaming Quilling	Weaving Inspecting Finishing
A	4 -5	5-6	6-7	6-7
B	6 -9	6-9	6-9	6-9
C	5	5-7	7-9	7-9
D	4 -5	5-6	6-7	6-7
E	2 -6	3-9	3-9	3-9
F	3½-4½	4-5	5-6	5-6
G	3½-4	4-4½	6	6-7
H	2 -6	3-9	3-9	3-9
I	2 -6	3-9	3-9	3-9
J	2 -6	3-9	3-9	3-9
K	5 -5½	5-6	6-7½	6-9
Averages	4.5	5.5	6.5	7

As shown by the table, the average levels of illumination for the coarser operations before the yarn has become drawn fine, are 4 to 6 foot-candles. The finer operations working drawn and spun yarn, require levels ranging from 6 to 9 foot-candles. It is reasonable to expect that mills working fine materials will require a higher level of illumination than one working very rough materials. A damask or plaid mill may require 6 foot-candles of illumination for carding, roving, and intermediates, and 9 foot-candles for spinning and weaving, while the same operations in an osnaburg mill may require only 4 to 6 foot-candles.

Mills working on dark cloth and yarn will require the higher recommended levels of illumination for any operation rather than the lower. This applies especially to the finer operations after the yarn has been dyed, such as spinning, weaving, and inspecting, or the rough operations in those mills working cotton dyed in the stock.

Shadows.—One of the important items that will classify the illumination in a mill as good, bad, or indifferent, is the character of the shadows.

Dense, sharp shadows are a prolific cause of industrial accidents. Shadows hide an object to be stumbled over—they may harbor a pair of revolving gears or a set-screw head that may catch loose clothes and hair. Past experience with shadows proves that workmen often mistake a *moving* shadow for the object itself, and an accident is the result. Many otherwise preventable accidents are the result of tired eyes and bodies. An industrial eye specialist made the broad statement that tired, abused eyes cause more general fatigue to the entire body than the misuse of any other organ. Flickering shadows, or appreciable differences of brightness on the work caused by dense shadows, are common sources of eye strain and fatigue. Serious or fatal accidents are probably lower in cotton mills than any other industry of equal importance, but as long as the mill superintendent's offices are supplied with Red Cross emergency kits, and as long as these small time-losing, near-serious accidents continue, it is certainly worth while to provide that quality and quantity of illuminaton which will minimize every possibility of accidents or injury. It has ever been the experience of the industries that accident-preventing illumination in which the shadows and glare have been minimized, is cheaper than accidents and ruined eyesight.

The human eye requires a definite interval of time to accommodate itself to different intensities of illumination. This results in the loss of working time when an employee must find it necessary to accommodate his eyesight from the brightly lighted work to a dense shadow, or vice versa. It can be calculated that if each employee in an average industrial plant can save or gain four minutes of working time each day, this saving alone will pay in dollars and cents for the cost of installing and operating a good illumination system.

The plentiful use of good white paint will go a long way toward eliminating harsh dark shadows, and will materially assist in utilizing the most illumination possible for a certain expenditure of wattage in a lighting system, or a given amount of daylight. In this respect, the cotton industry is to be commended; white paint is plentifully used and generally well maintained, and windows are in evidence in proportions found in no other industry of like importance. However, it is not to be expected that paint and windows will satisfy all the lighting requirements in the average mill. There are dark winter days, night shifts, long rows of high machines, and exacting demands of vision which require that in every efficient mill there be a good system of artificial illumination capable of making it independent of seasonal and weather conditions. There are few cotton mills where daylight is sufficient in all parts of the mill even on the brightest days. The center aisles in a card room, in the speeder section, in a spinning room, and the looms in the center of a weave room very often have had shadows on the work, and seldom have sufficient illumination from daylight alone. The employees on these inside machines should have the same chance to turn out a perfect product as the more fortunate employees on those machines nearer the windows.

Shadows cast from a large source of light are much softer and luminous than those from a small source. Accordingly, the shadows resulting from the use of a 200-watt bowl-enameled Mazda C lamp in a 16-inch RLM dome will be softer and less dangerous, than those from a deep bowl with a clear lamp in which the bare filament and small reflector diameter combine to make the shadows sharp and dense.

Large Mazda lamps are more efficient in light output per watt expended than small ones; one 200-watt Mazda C lamp emits more light than six 50-watt lamps, and one 1000-watt Mazda C lamp gives more than six 200-watt lamps. If it were not for the unevenness of illumination and the objectionable shadows cast by a small number of large units spaced far apart, the greatest economy would result from the use of lamps of the 500-1000-watt sizes, only. On the other hand, the shadows would be minimized by the use of a large number of 50-watt lamps spaced close together. There is an economical balance between these two extremes applicable to textile mill illumination, indicating that Mazda C lamps of 100, 150 and 200-watt sizes on an average 10-16 foot spacing will probably give the best results in illumination economy as well as shadow elimination.

It should not be understood that it would be desirable to *eliminate* shadows, for a certain amount of shadow or relief is needed on objects to make them visible in three dimensions. A certain amount of relief is also necessary to show the patterns on uncolored fancy cloth. Shadows should be so soft that there will be no chance of confusion between a shadow and the object causing it.

Glare.—Glare, loosely defined as "light out of place,' is the most frequent and serious characteristic of bad lighting. It results from the use of bare lamps, or from clear lamps in reflectors which do not have a sufficient shielding angle. Glare in the eyes of an observer leads to the erroneous verdict "too much light." Too often the mistake is made of trying to judge the illumination in a room by the visible glare. In a factory, the work plane should be the place for light—not the eyes of the worker. In itself, glare is an evidence of poor economy, of wasted light and a probability of eye fatigue and headache. One of the later state lighting codes condemns glare as follows:

"Glare results in decreased ability to see, it may cause temporary discomfort and if the condition is long continued, may result in permanent injury to the eyesight. This decreased ability to see results in a lower quality and decreased quantity of output; consequently, aside from the discomfort and danger to the eyes, glare is economically bad."

The degree to which glare becomes objectionable depends upon five principal factors:

1. Intrinsic brilliancy of the source.
2. Total candlepower coming from the source in the direction of the eye.
3. Distance from the source to the eye; and the proximity to the line of vision.
4. Contrast in brightness between the light source and the working surfaces and surroundings.
5. Length of time during which the source of glare is present within the field of vision.

There are, of course, several means by which the most objectionable glare can be prevented. Mazda C lamps of the medium sizes, 75-200-watt having the filament shielded by good reflecting or diffusing equipment and mounted 10 feet or more above the floor, will go a long way in minimizing the first of these items.

The plentiful use of white or light cream paint will assist in eliminating harsh contrasts in brightness between the light source and the working surface and surroundings. In mills working on dark materials, there is very little light reflected from the work to the ceiling, and in order to eliminate the harsh contrast between the lighting unit and the ceiling, reflectors described later can be used which direct a small part of the light to the ceiling.

Sources of light that are not uncomfortable when viewed casually during the normal movement about the mill, may be sources of extreme discomfort to the worker who must face them for many hours a day. One of the most common examples of this is the average window. Those operations which require employees to stay in one place for any great length of time, such as drawing-in, warping and beaming, should be so arranged that the employees may work with their backs to the windows. This not only saves their eyes from glare, but puts a much better illumination on the work. Artificial lighting units for these operations may easily be located where they will be well out of the direct field of vision.

Glare is one of the more prolific causes of failing eyesight found in middle aged employees. Fortunately, it can be easily prevented by care in the selection of proper lamps and reflectors, and in their location.

Direction of Light.—In the usual industry, the greater part of the surfaces to be lighted are in the horizontal plane. This is not true in the cotton manufacturing industry, for although the important working surfaces in carding room, weave room, and cloth room are horizontal, the chief planes of work in spinning, twisting and drawing-in processes are vertical. Because of the diversified cotton mill requirements, it is very desirable to select a unit which has a good balance of the horizontal and vertical illumination efficiencies. In selecting a unit, proper attention should also be given to the other essentials such as protection from glare and shadows.

When incandescent lamps were first used in cotton mills there were no good reflectors available and it was found necessary to hang the lamps low on drop cords, and use a large number of small bare local lamps in every work aisle in order that sufficient light might be obtained on vertical surfaces. This was uneconomical, and in addition to the glare prevalent, the illumination was likely to be

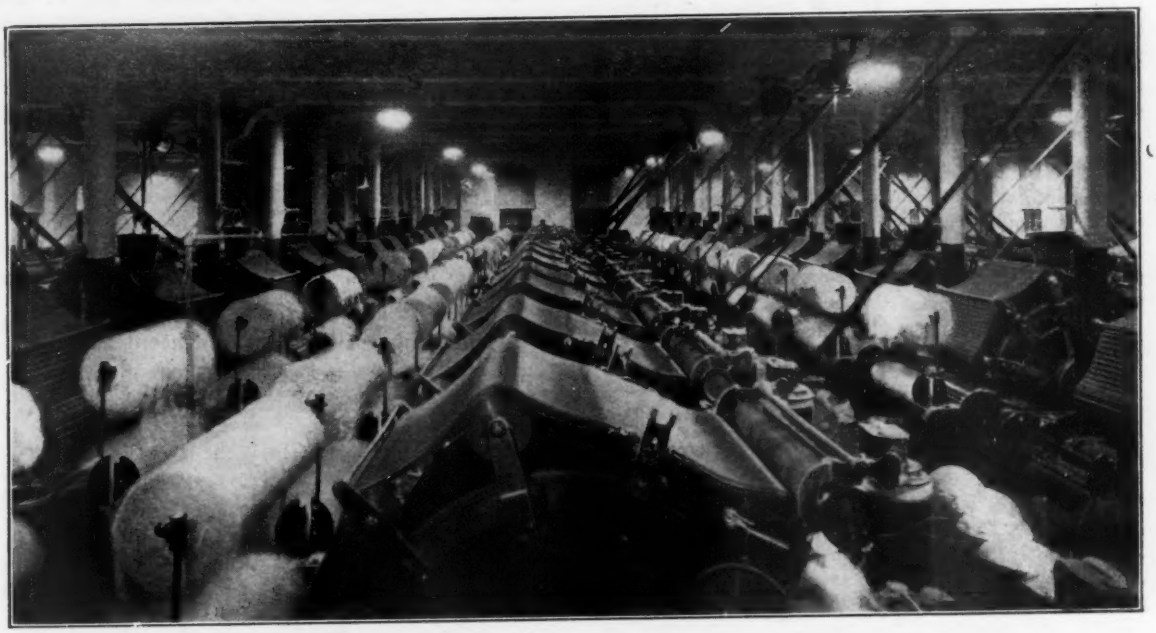


FIG. 4. A CARD ROOM WITH PLENTY OF LIGHT IN ALL WORK AISLES AND BETWEEN MACHINES.

uneven and spotty because of the tendency to space the units too far apart. As well designed reflecting equipment for use with the higher efficiency Mazda C lamps became available, general lighting systems came into use, in which the larger lamps were mounted well above the plane of work on a wider spacing, and arranged symmetrically with respect to the building bays. In textile mill illumination, however, provision must be made to light special work surfaces. This calls for an arrangement of the lighting system called "group lighting." In this type of lighting, the units using medium sizes of Mazda lamps are spaced with regard to work aisles or groups of machines, rather than symmetrical with the building dimensions, and are mounted 10-16 feet above the floor.

In later articles will be illustrations showing the grouping of units with respect to the machines for the more important mill operations.

Quality of Illumination.—As daylight intensities represent the standards which are to be sought in the artificial lighting of industrial plants, so should the color of daylight constitute the standard which should be approached in artificial illumination. Through centuries of evolution, the human eye has become accustomed to the color and intensity of light represented by daylight. Not only will the light within these ranges and colors be more pleasing and stimulating, but modern research indicates that the eye will function more efficiently. The human eye has also learned to judge colors under daylight illumination, and where color discrimination is needed in colored goods, plaid, and denim mills, day light quality of illumination will be found very desirable. When yarn colors are viewed under daylight quality of artificial illumination, they will assume the same color as though they were observed under a sky light or near the window. Broken colored warp which must be replaced in a loom will then be replaced with the proper color, rather than with one which is only *near* the proper color. Daylight Mazda lamps, recognized by the blue-green filter glass bulb, were developed for use in those places where the pleasing effect of daylight quality illumination is desired. These lamps give an illumination quality closer to true daylight than clear Mazda lamps, and while they are generally found satisfactory for lighting plaid and denim mills not having close color matching requirements, they should not be depended on for cotton grading or for matching close color tints.

Cotton grading is one of the important operations in the average cotton mill. It is only by such means that the cotton buyer knows when he is getting a good grade of the proper color and grade of cotton as well as the proper length staple. The original standard samples by which cotton is graded were selected under north sky light conditions, and if a true match is desired this same quality of illumination must be duplicated when cotton to be purchased is matched against these standards. The illumination from Mazda daylight lamps does not duplicate north sky light conditions close enough for cotton grading. Rather a color matching unit equivalent to that illustrated in Fig. 2 should be used. These units are also found useful in the matching room of knitting mills, especially those mills desiring a close color match in the high grade hosiery.

Bright Ceilings.—The human race has evolved under out-door conditions where the brightest part of the surroundings are above the horizon, and it is only natural that a work room having a lighted ceiling will appear cheerful and free from the tunnel-like aspect which a dark, gloomy ceiling gives. The white materials and rolls of cotton in a white or gray goods mill will reflect sufficient light to the ceiling to make the room cheerful even though the reflectors themselves do not direct any light above the horizontal. There are rooms, however, using dark materials and machines where some other provision should be

FIG. 2. COLOR MATCHING UNIT.

made for brightening the ceilings. Gloomy interiors often found in plaid, denim, and cheviot mills may be made to have a more cheerful atmosphere by the plentiful use of white paint on the upper side walls and ceilings, and by using a type of reflector which has an upward component of light.

Glass units such as the dense opal bowl, or prismatic glass units allow a portion of the light to go to the ceiling. If it is desired to use porcelain-enameled steel reflectors, the glass top dome may be used. In this unit a small opal cap substitutes for a portion of the reflector near the holder, and allows a small, but ample, quantity of the light to be transmitted upward.

The Proper Use of Incandescent Lamps.

Mazda lamps are of two general types, the Mazda B or vacuum lamps in sizes 10 to 60 watts, and the Mazda C gas filled lamps ranging in sizes 75 to 1000 watts. Because of the better efficiency of the larger Mazda C lamps they are more suited to industrial use than the Mazda B lamps, and since the filament is more concentrated in the gas filled lamps, it is easier to obtain a good distribution of light by means of reflecting, refracting and diffusing equipment. The filaments of the Mazda C lamps have a higher brilliancy than the vacuum lamps and should be used only in equipment which is designed to eliminate the harmful glare by means of shielding or diffusing media.

The glare from Mazda C lamps in dome reflectors may be made less objectionable by using bowl-enameled lamps instead of clear ones. The enamel is sprayed and baked on the bowl of the lamps just high enough to cut off a direct view of the filament when used in an RLM standard dome, but will give the same protection when used in any reflector having a similar shielding angle. The density of the enamel is such that the brightness of the lamp bowl is not excessive. The largest part of the light is reflected from this bowl enamel to the upper surface of the reflector and returned as diffused light.

In some mills where it is necessary to use artificial illumination throughout the day in one part of a room, while other parts of the room are lighted by daylight, it is desirable to use Mazda Daylight lamps instead of clear lamps in order that the artificially lighted areas will not look

yellowish as compared to those which have the advantage of natural daylight. Because of the blue-green filter glass used in daylight lamps, and the consequent absorption of light, it is necessary to use the next higher wattage lamp than a clear lamp, to produce a given level of illumination. Daylight lamps used in open reflectors should be bowl-frosted.

Voltage Regulation.

Electric power for many cotton mills is transmitted from a long distance, and comes into the mill unregulated. In such cases, the power company or central station selling the power generally makes a paragraph provision in their contract with the mill, that where the power is to be used for lighting purposes, the mill owners should install adequate regulating equipment at their own expense. When the modern and efficient Mazda lamps are sold and guarantees made as to the light, life and service, it is assumed that they will be given proper consideration as to the voltage value and regulation. Only under such conditions will the greatest benefits from them be realized. Incandescent lamps operating at a voltage *10 per cent above* that marked on the label will be consuming 85 per cent of normal wattage, and will be giving only 70 per cent of the rated light output, as shown in the diagrams of Fig. 3. This is undoubtedly an uneconomical practice which can be easily corrected by installing one of the many good makes of automatic voltage regulators. These regulators may be made to automatically correct a voltage variation within ten per cent above and below normal value, thus correcting a total twenty per cent voltage fluctuation.

It will be found that cheaply wired mills often use wire of insufficient size or capacity, and due to the voltage drop along the line, the voltage at the ends of the circuits has a much lower value than that at the switchboard. As a result, lamps which are purchased for the voltage at the extreme ends of the circuit will burn out quickly when used

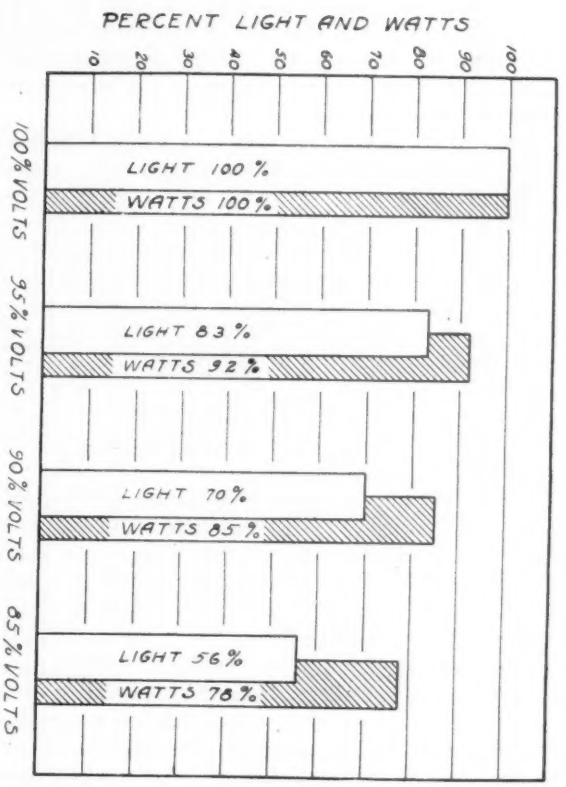


FIG. 3. THE POOR ECONOMY OF OPERATING LAMPS UNDER—VOLTAGE IS SHOWN BY THE RELATIVE PERCENTAGES OF LIGHT OUTPUT AND WATTAGE CONSUMED.

on the higher voltage near the switchboard, because they are burning over rated voltage; lamps specified for the switchboard voltage will operate inefficiently on the lower voltages at the circuit ends. An excessive voltage drop in

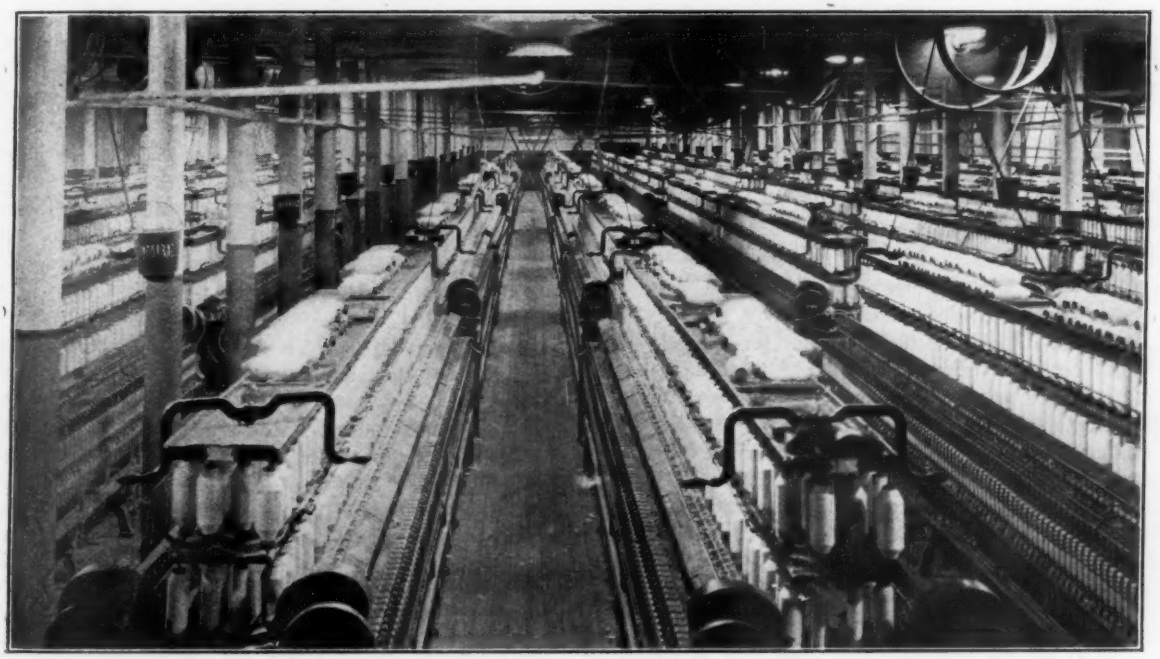


FIG. 5. A WELL LIGHTED SPINNING ROOM PROMOTES CLEANLINESS AND CHEERFULNESS.

a distribution system having wire of insufficient capacity, may sometimes be remedied by making additional cuts in the long circuits and running in heavier feed wires to the centers of the new circuits.

Installations or buildings where new wire is to be used, will find it most economical in the end to employ wire of a size and capacity that will limit the voltage drop from switchboard to circuit ends, to a maximum of two per cent. The present high standards of lighting as compared to those of a few years ago are due largely to a better appreciation of the value and advantages accompanying a high level of well diffused illumination. Accordingly, it is well in designing the wiring for an illumination system, to plan for any future increases in wattage by using wire sufficiently large—at least larger than absolutely necessary for the present. Oversize wire is an ultimate economy in the same class with oversize tires and motors.

At all times, lamps should be specified of a power voltage to fit the average voltage measured at the centers of the circuits in the distribution system. The voltage should be measured *with the lamps all lighted,* because the voltage drops in the circuits will be taken into account, and the true operating condition duplicated only when normal operating current value is going through the circuits.

For the best operation, lighting and power loads should be carried on separate circuits. Not only are voltage fluctuations caused by the automatic stopping of looms and warpers, and the starting of motors thereby confined mainly to the power circuit and their harmful effects upon lamp performance thus reduced, but with such an arrangement a shut down in the power circuit will not cut off the illumination of the mill at a crucial time when light is needed for repairs.

[This is the first section of an article on illumination in cotton mills by Mr. Ketch. The remaining portions will appear later.]

O. C. Wainwright & Company, the new cloth and yarn brokerage firm organized by O. C. Wainwright, formerly secretary and general manager of the Stonewall Cotton Mills, Stonewall, Miss., has taken offices at 350 Broadway, New York City. As reported, Mr. Wainwright recently resigned his connection with the Stonewall Cotton Mills to make this move, and his many friends wish him the best of success in his undertaking.

The Goulds Manufacturing Company, Seneca Falls, N. Y., are distributing their calendar for the year 1922. This calendar is arranged in a form particularly useful for reference purposes, showing the month preceding and the month following the prevailing month on each sheet. It illustrates the triplex, centrifugal, rotary, deep well and hand pumps for every service made by this company. The southern district office is located in the Citizens & Southern Bank Building, Atlanta, Ga., with O. B. Tanner as manager and C. R. Smith as assistant manager. A branch office is also maintained in Charlotte, N. C.

After all has been said and done, it is far better to be thought a fool and remain silent, than to speak and remove all doubt.

Sixty-Six to Eleven.

(*Continued from page* 144)

themselves that would meet these ends. There is the difficulty of entering into such agreements, the possibility that they comprise some violation of the trade acts; and upon this administration coming to Washington, we felt that we could perform a service to manufacturers if we acted as a center point around which their own cooperative action could take place.

"It is not the desire of this Department to enter into any compulsory methods. I do not believe that the impulse and progress of American industry can come from government legislation or interference; but there are occasions, I think, when the friendly help of the government can furnish a center point for the communication and discussion of manufacturing groups and those professions and trades with which they must also come to some conclusion. * * * *

"There are a number of industries in which the manufacturers are carrying on their own surveys and are in consultation with the Department, but to make any of this effective does not lie entirely with the manufacturerts, who must have the cooperation of outside groups, and this is the first time we have attempted to bring the groups together, first the manufacturer, then those who dominate his consumption, so that I am in hopes that we can get results; and I know that all of you will enter into the conference with the desire to secure something effective from it."

Manufacturers in all lines realize the advantages to be derived from simplification in the styles manufactured. It is not always so easy to determine just how such changes or eliminations may be applied to the greatest advantage, but cooperative thought and action by manufacturers through their associations will undoubtedly find a way to aid in reducing the "area of waste" referred to by Secretary Hoover and at the same time secure a better manufacturing basis upon which to conduct their plants.

A short circuit in a metal fuse box on the ceiling of the card room caused sparks which ignited fly on the ceiling.

During the night a fuse blew out on the first floor. This fuse controlled a motor on the top floor. The following night the electrician started to investigate the cause and replaced the blown fuse, after which he started the motor on the top floor. A short circuit followed and two fuses blew out, sparks from these igniting cotton on a speeder.

These two notes from the report of an insurance company indicate the necessity of care in the selection of safety or enclosed fuses. While the losses were comparatively small, the several hundred dollars involved would have purchased the necessary fuses and prevented the fire.

Domestic exports of textile machinery from the United States during October, 1921, included cotton carding and spinning machinery to the value of $1,380,019; one cotton loom to the value of $150; and "all other textile machinery" to the value of $344,771. China was the largest taker of cotton carding and spinning machinery with $770,868; Japan second with $394,024; and British India third with $170,182.

Popular Textile Chemistry

BY JAMES A. BRANEGAN,

PRESIDENT, KALI MANUFACTURING CO., PHILADELPHIA.

Wood Products
Acetic Acid, Wood Alcohol, Formaldehyde.

When wood is placed in a retort and subjected to a high heat a decomposition called "destructive distillation" takes place. This process yields, besides a residue of charcoal, tar, inflammable gases and an aqueous distillate which is strongly acid. This distillate known as *pyroligneous acid* contains methyl (wood) alcohol and acetic acid besides small amounts of acetone, methyl acetate, and tar. The tarry matters settle out on standing and the liquid portion containing the acetic acid is drawn off. The next step is to add lime until neutral, which converts the acetic acid into calcium acetate (acetate of lime). Distillation follows and methyl alcohol and acetone together pass into the receiver leaving the acetate of lime in the still.

Acetic Acid (CH_3COOH).

The dry acetate of lime is carefully heated in order to burn off or carbonize most of the impurities, the final product having a gray color and known commercially as "gray acetate of lime."

This acetate of lime, or calcium acetate as it should be called, is mixed with sulphuric acid and distilled and the sulphuric acid having a greater affinity for the calcium drives out the acetic acid which passes over into the receiver while the sulphuric and calcium remain behind in the still as calcium sulphate (sulphate of lime). This calcium sulphate is of little value and is usually discarded.

The acetic acid is purified by redistillation, the final product containing 75 per cent to 80 per cent of actual acetic acid. This is diluted with water to 28 per cent, 56 per cent, 70 per cent, and shipped in carboys or paraffin lined barrels. Where deliveries are made by team 28 per cent is preferred as this is the strength upon which most dyehouse formulas are based, but shipments by rail or boat are usually 56 per cent or 70 per cent in order to save the freight on the water. The chemistry of acetic acid is very simple. The formula for the calcium acetate (acetate of lime) mentioned above is Ca $(C_2H_3O_2)_2$ which means one atom of calcium and two complete radicles of the acetate $(C_2H_3O_2)_2$ each of which contain two atoms of carbon, three atoms of hydrogen and two atoms of oxygen. The figure "2" after the parenthesis means that everything within the parenthesis is taken twice. As there is no figure after the calcium it is understood as one atom of that element as in writing chemical formulas we omit the figure one. The formula for sulphuric acid (hydrogen sulphate) is H_2SO_4, two atoms of hydrogen, one atom of sulphur, and four atoms of oxygen. When we add sulphuric acid to calcium acetate we find the calcium has a greater affinity for the sulphuric acid than it has for the acetate. The sulphuric acid at once combines with the calcium and sets free the acetate (acetic acid) which is distilled off in bronze retorts. The reaction is expressed chemically

CALCIUM ACETATE — SULPHURIC ACID — CALCIUM SULPHATE — ACETIC ACID

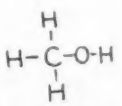
$$Ca\,[(C_2H_3O_2)_2 + H_2]\,SO_4 = CaSO_4 + H_2(C_2H_3O_2)_2$$

or 2 H $C_2H_3O_2$ as correctly written, meaning two complete molecules of acetic acid. Note how the equation balances and every atom finds its place, with none left over.

Acetic acid is formed naturally in vinegar which usually contains 4 per cent to 8 per cent. This vinegar acetic acid is exactly the same as that produced chemically. The vinegar, however, contains certain ethers and flavoring matters from the grape or apple which makes it more palatable than straight acetic acid and water. Nevertheless, this latter mixture is frequently sold under the name of white wine vinegar.

Wood Alcohol (Methyl Alcohol) (CH_3OH).

The mixture of methyl alcohol and acetone mentioned above as distilled from the acetate of lime, is carefully fractionated, in other words, it is heated to at least 56 degrees C. at which temperature the acetone distills over leaving the alcohol to flow back into the stills. Special column stills are used for this purpose and the whole operation is conducted with great care. The formula for wood alcohol is CH_3OH meaning one atom of carbon, three atoms of hydrogen, and one molecule of the hydroxyl group (OH). The presence of this hydroxyl group in an organic compound denotes an alcohol. The various elements in wood alcohol are not strung out in a line but are connected as follows:



From this structure it will be seen that carbon supports four bonds, oxygen two bonds, and each of the hydrogen atoms one bond. This capacity of the elements of having bonds which must all be satisfied is called valence or the combining power of an element as compared with hydrogen, which is the unit or one. Wood alcohol boils at 66 degrees C. It is inflammable, and burns with a blue flame. It is very poisonous and if taken internally will cause blindness and death.

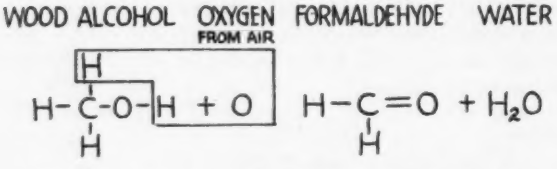
Formaldehyde (HCHO).

In the manufacture of formaldehyde only one raw material is required and that is methyl (wood) alcohol, the other essentials are heat and air. The process is described as the "Oxidation of Wood Alcohol" and as only one material is required and as there are no by-products, it reads as if the process was very simple. In reality, however, the process is extremely difficult as it needs very delicate control of pressure and heat, and while it is true there are no by-products, it is also true that at times complete combustion is the result and nothing whatsoever is produced.

The oxidation of wood alcohol to formaldehyde is induced by the action of a "catalyst." In a former article on sulphuric acid I described a catalyst as follows:

"The word 'catalytic' which is used to express the reaction in the 'contact process,' is simply a mask to cover something which actually takes place but which we can explain only in theory. A correct definition of 'catalysis' in plain English would be as follows: 'A new combination effected

by one substance acting upon a compound body (or bodies), itself remaining unchanged.'" One theory offered is that oxygen in the presence of the catalyst is converted into a "nascent" condition, meaning a condition in which it readily combines with substances or gases which are susceptible to oxidation. The "nascent" condition of the elements is thoroughly understood and proven in regular chemical reactions but in catalysis is only suggested by the writer as a theoretical explanation. In the case of formaldehyde the usual catalyst is copper gauze, although some operators have used platinum, others nickel and silver together, and clays also have been used. The methods, however, are practically the same. The "catalyst" is placed in a metal cylinder or a battery of cylinders or tubes of various diameters usually from two inches up to five and six inches and about three feet long. These cylinders are heated to the desired temperature and the mixture of wood alcohol and air, also heated, is passed through. When once the reaction starts external heat is no longer required as the heat generated by the contact with the catalyzer is sufficient. When the mixture of air and wood alcohol comes in contact with the catalyzer material, the oxygen in the air combines with two atoms of hydrogen in the wood alcohol, the result being formeldahyde and water. Chemically the reaction is expressed as follows:



Note how the oxygen from the air combines the two atoms of hydrogen in the alcohol in the formation of water. Also note how the arm of the carbon atom which has been deprived of hydrogen swings around and combines with the arm of the oxygen which also lost a hydrogen atom, thus forming a double bond. For the sake of brevity water is written as H_2O and formaldehyde HCHO. In practice the greatest care must be taken to keep the temperature and pressure exactly right and also the volume in the mixture must be controlled, otherwise, the alcohol would be completely consumed and burned to carbonic acid and water.

The resulting product is never all formaldehyde but is a mixture of formaldehyde, wood alcohol, and water. This mixture is condensed in the usual manner by passing through coils or pipes surrounded by cold water. Finally this mixture is redistilled in a "fractionating" still which separates out the alcohol leaving formaldehyde of high strength. This high strength formaldehyde is diluted to 40 per cent by volume (37 per cent by weight) and shipped in paraffin lined barrels or carboys. A certain amount of wood alcohol is left in the formaldehyde to preserve it as otherwise it would solidify and precipitate as solid formaldehyde. (This solid formaldehyde when once formed is very hard to redissolve and is used to a limited extent in medicine and for disinfecting).

Formaldehyde acts somewhat like an acid and combines with alkalis to form salts. With ammonia it combines readily and it is this reaction which takes place when formaldehyde is used in direct colors. This class of dyes sometimes contain partially free ammonia or as usually expressed an open ammonia (ammino) group and as long as this ammino group is open the dyeing is apt to be incomplete and lack fastness. The final addition of formaldehyde in the dyeing process closes this group, and completes the dye and makes the color insoluble and therefore more fast. Formaldehyde is also used in the manufacture of dyes and for disinfecting purposes, in embalming fluid, and largely in the manufacture of compounds resembling celluloid. These compounds are "condensation" products, and are usually produced by condensing together formaldehyde and hydrocarbons like the phenols. Such well known products as Bakelite, Condesite, etc., are made along these lines. The farmers use formaldehyde in very weak solutions for preventing and destroying "potato scab" in seed potatoes and in medicine the compounds of formaldehyde are used extensively, particularly in diseases of the bladder. The growing leaves on the trees give off formaldehyde and it is interesting to note that tobacco when burned produces small amounts of formaldehyde so there may be some truth in the statement that the smoking of tobacco is a preventive against diseases, the writer, however, is not prepared to say that the amount of formaldehyde so produced is sufficient for disinfecting purposes.

The next article will be on Ammonia and its Salts.

The Handicraft Art of Weaving.

For a number of years the interest taken in arts and crafts has increased, not only because of the entertaining nature of many of the operations, but also because an extended knowledge of how these operations should be conducted is often of great value to those persons who ultimately become associated with commercial, industrial and domestic pursuits. In this respect there is, perhaps, no handicraft art which is more valuable than that of weaving, for, in the fundamental processes, the student becomes more or less skilful in the manipulation of threads; this skill first of all acts as an introduction to darning, and later leads up to embroidery, and ultimately to the important subject of textile design.

In "The Handicraft Art of Weaving," a new book by Thomas Woodhouse which has just been published, the principles involved in darning and in fundamental weaving are described and illustrated in several different ways, while the processes of cloth structure by handicraft methods are systematically arranged. Thus, simple methods of warping, beaming, and frame weaving are fully illustrated and described, and finally the somewhat similar methods adopted in the commercial manufacture of Oriental, Donegal and Real Axminster carpets are discussed at length.

The book, which contains 162 pages of text, is written by a man well known to COTTON'S readers as the author of a number of serial articles on weaving and designing that have appeared in COTTON from time to time. It is well prepared, and should be of much value to those interested in these phases of textile manufacture. The price per copy is six shillings, and the publishers are Henry Frowde and Hodder and Stoughton, 1 & 2 Bedford St., Strand, W. C. 2, London. COTTON'S Book Department will be glad to secure copies for any interested readers.

Six Definite Things That Workers Want

3. To See The Wheels Go Round

BY JAMES H. COLLINS.

At the peak of war production, a New England plant began paying its employees a bonus of one week's wages every three months, with two week's pay at Christmas. Every time the bonus was slipped into pay envelopes a letter went in too, speaking of business conditions. Thus employees understood that this extra money was not a gift, but extra earnings, their dividend on good times.

When depression came, employees felt that the bonus must stop. To their surprise, there was an extra week's pay when the next bonus day came round. This time, however, the letter speaking of business conditions explained that, as the mill had only been working two to three days a week for several months, an early reduction in wages would be necessary. The reduction was accepted without protest—everybody knew that it was inevitable, caused by outside business conditions, beyond the control of the management.

The large number of employee periodicals published by business concerns throughout the United States is sufficient proof that workers like to know what is going on in the organizations of which they are a part. They want to see the wheels go round. Such periodicals print pages of personal items that serve the same purpose as the items in the country weekly. But there is even keener interest in solid articles about current business conditions, company policies, technical equipment and methods, the work of different departments. In a widely scattered organization like that of a telephone corporation, for example, the worker in the accounting department may have little opportunity to become personally familiar with the people and methods in the operating or wire chief's rooms of the many exchanges, the routine of long-distance traffic, the repair department, the gangs that erect new lines across states or fight sleet damage. Yet through their employee magazines, telephone people keep track of the service as a whole, are better fitted for their own work because they understand somthing about the work of others.

Workers in a certain Eastern organization have a spirit that can be illustrated with a story. A customer persuaded one of its girl stenographers to become his secretary, at an increased salary. In a couple of weeks she came in and said she was homesick for her old associates, and asked if she might be taken back, a request that was granted. This organization has an atmosphere of friendliness and service—even the fifteen-year-old office boys show it in their alert courtesy to strangers. That spirit has been created largely by showing, through the printed word, opportunities for advancement—the personal stories of men and women who have risen as they learned different branches of the company's work and developed personal ability. The wheels of promotion are purposely kept in plain sight.

Not every business concern is large enough or rich enough to publish an employee magazine—certainly not of the kind issued by one Middle-Western manufacturing company which is said to pay its "house organ" editor $10,000 a year. Apart from printing and paper costs, writing and editing such a periodical involves a great deal of work. But there are other ways, involving little expense, by which employees can be given information about a business—slips in pay envelopes, announcements on bulletin boards, talks at employee gatherings, special exhibits that visualize, exhibits that make information visible.

During the difficult downward adjustment of wages, when pay envelopes were shrinking two ways—in wages per hour, and the number of hours' work—the personnel director of an Eastern factory used a simple device to show that the cloud had a silver lining. Wages were falling, but the cost of food, clothing and other items in living expenses was falling too. Taking wages in that plant, and the government's commodity-price figures month by month, he showed by two thermometers that, while wages had dropped twenty per cent in a year, the purchasing power of a dollar had risen a little more than twenty-five per cent in the past six months. By changing his thermometers each month he set employees thinking of what the economists call "real wages" instead of dollars—the purchasing power of the money they earn.

There was considerable carelessness among the employees of another concern in using supplies—little things like thumb-tacks, clips, twine, wire. One night the junk and sweepings of the plant were turned over to the purchasing agent, who sorted out different things, tagged them with the prices he was paying for each article, and arranged them in an exhibition. It was an interesting show. Some fellow had tied up a package of rubbish, thinking he was helpful. But he had tied it with sixty five feet of good copper wire, worth not less than fifty cents! Another package was tied with a special kind of thread worth two dollars a pound. Screws, bolts, nails, small tools and the like, all fit for use again, had been swept up from the floor. One practical way of saving such things was indicated by two tool bags. Sloppy Sam's tool bag had everything jumbled together so that nothing could be found, while the contents of Orderly Otto's tool bag were shown as he sorted the different things out every night, and packed each where he could immediately put his fingers on it.

Every employer has some information by which to estimate current business conditions, forecast the future and plan output. He may know that six months hence the work force will be decreased. He is already trying to make the shrinkage as small as possible. Employees might help in a half dozen ways if they know—economy of materials and time, attention to quality, more intelligent teamwork. But lacking knowledge about conditions, and fooled by present activity, they may be thinking about a wage increase—"Aw, the company's rich, and can stand it!" Put in simple diagrams, the Old Man's data, the footrule he puts on business conditions, would be interesting to employees and give them a viewpoint based on facts.

Giving employees better information about the busi-

(Copyright, 1922 by J. K. Nevins.)

ness will correct much misunderstanding about their personal interests—concrete things like wages and hours, which they see close at hand. Better information is even more effective in creating better understanding between different departments, and taking up expensive slack.

When re-adjustment loomed up, Henry Ford found that he would need forty-odd million dollars to meet early obligations. Wall Street discovered it too, and hurried to suggest a loan. Mr. Ford declined to borrow, closed his plant down six weeks for an inventory to find out where he stood, and raised the money by cutting out interdepartmental slack and stimulating teamwork. There were ninety-three thousand finished automobiles on one hand, and a sales organization capable of increasing its activities on the other. When the sales force knew what was necessary, it sold the cars. There was a war-swollen supervisory organization of desk men. The desks were sold, and the men offered production jobs in the factory. Mr. Ford owned a railroad by which, through quickening the traffic in both raw materials and finished cars, he cut down the material and finished product investment nearly $30,000,000. Had these drastic changes been attempted without letting employees see the wheels, there would unquestionably have been misunderstandings and opposition. By making the whole situation plain to everybody, there was such teamwork that the labor and overhead cost of building a "Tin Lizzie" dropped nearly ten dollars a month during the next six months.

After making a study of two hundred employee publications, Professor Robert E. Park, of the University of Chicago, says that while most of them seem to be edited *for* the employer and *at* the employee, yet their publication assumes that the relation between employer and employee is not one of mere money, and that there is nothing that so satisfactorily ameliorates between employer and employee, and maintains morale, as a well-conducted employee publication. This conclusion may be broadly applied to all honest information given employees by employers, by whatever method distributed. The remarkable increase in such information is not wholly voluntary on the part of executives—it grows because there is a genuine employee demand for it.

In October a fire destroyed the Penick warehouse at Madison, Ga., causing a loss of approximately $200,000, and in the newspaper reports on October 16, it was stated that the automatic sprinkler system, with which the warehouse was equipped, failed to work. However, advice from the office of the National Automatic Sprinkler Association states that though the warehouse was equipped with a sprinkler system, the reason it did not control the fire was because the water supply was shut off, and that a sprinkler system does not function in controlling fire without an adequate supply of water.

National Niagara Blue HW is a new dye recently brought out by the National Aniline & Chemical Company, which is particularly recommended by them for union dyeing, as cotton and wool are dyed practically the same shade and depth. When dyed by the direct method on cotton, it is stated, this cotton yields a fine medium blue shade; and will also dye wool in unions without a reddish cast. Clear white discharges are obtained with hydrosulphite.

James W. Cannon.

In the death of James W. Cannon, the southern textile industry lost one of its greatest builders, a pioneer who was one of the largest factors in the development of that industry. Mr. Cannon's death occurred at his home in Concord, N. C., on Monday night, December 19. Heart failure was the immediate cause of his detah, following an illness of two weeks.

Born of rural parentage, in 1852, and leaving the home of his father in Mecklenburg County, North Carolina, when fourteen years of age, to become a clerk in a country store. Mr. Cannon's keen vision and foresight, his untiring energy and the courage to follow the dictates of his judgment, advanced him to an honored place among the highest rank of cotton manufacturers and merchants. At twenty years of age, he undertook his first business venture—a partnership in a small country store—and at sixty-nine, at the time of his death, he was head of the largest cotton mill organization in the South, including 600,000 spindles and 10,000 looms.

All through his career, it was Mr. Cannon's dream to have a model, complete industrial community. The town of Kannapolis, North Carolina, where his largest mills are located, stands as everlasting evidence of the fulfillment of this vision. Here Mr. Cannon erected the plants which manufacture more towels than any other single group of mills in the world; here he has made his ideal into a reality, with model schools, churches, welfare and Y. M. C. A. buildings, a modern home for girl operatives, and everything necessary to the requirements of the ideal which he carried with him throughout his life.

At the time of his death, Mr. Cannon was president, chairman of the board of directors, or actively identified with the following mills: Cannon Mfg. Company, with plants at Concord and Kannapolis, N. C., and York, S. C.; Cabarrus Mfg. Co., with mills at Concord and Kannapolis; the Gibson and Franklin Mills at Concord; the Patterson Mfg. Co.; the Amazon Mills, Thomasville, N. C.; Barringer Mfg. Co., Rockwell, N. C.; Efird and Wiscassett Mills, Albemarle, N. C.; Tuscarora Mills, Mt. Pleasant, N. C.; Bloomfield Mfg. Co., Statesville, N. C.; Social Circle (Ga.) Mills; Imperial Cotton Mills, Eatonton, Ga.; and the Buck Creek Mills at Siluria, Ala.

Another great cotton mill man has passed into the Great Beyond, leaving behind, as a number of his contemporaries have left behind them, a forceful illustration of the results of determination and perseverance. He was a dreamer, with the genius and native ability to bring fulfillment to his dreams; he was a pioneer in southern cotton manufacturing, a man of vision who foresaw the possibilities in converting the South's staple into manufactured products in the same section, and with the ability and courage to sustain his judgment, he rose through the entire span to the height of success and ambition. The light of his influence shall continue to shine through time, a beacon of encouragement and an example to all those struggling under adversity, an inspiration urging them on to the attainment of their purpose.

Reginned and Cleaned Cotton

Results Obtained From Some Spinning Tests.

BY W. R. MEADOWS AND W. G. BLAIR,

BUREAU OF MARKETS AND CROP ESTIMATES, U. S. DEPARTMENT OF AGRICULTURE.

In a cotton growing season of unusually heavy rainfall and early frosts, a considerable amount of low grade cotton is thrown upon the market. A number of firms have undertaken to re-gin this low grade cotton and others to clean it and thus improve the grade, before the cotton reaches the mill.

Manufacturing tests of 7/8-inch cotton of the above character have been made by the Federal Bureau of Markets and Crop Estimates to determine, if possible, its value. These tests were conducted in the Textile Department of the North Carolina State College of Agriculture and Engineering, Raleigh, N. C.

The cotton used in each case consisted of three lots:—one lot represented a mixture of cotton before being reginned or cleaned; another lot represented the cotton after reginning or cleaning; and the third lot represented a different bale which equalled in grade the reginned or cleaned cotton. The cotton was classed by the Board of Examiners of the United States Department of Agriculture at New Orleans.

Test No. 1 on Cleaned Cotton: In the process through which this cotton had passed, there was a continuous passage through several machines commonly used in a cotton mill such as a bale breaker, a hopper feeder, a drying oven, and Creighton openers. The cotton was then put up in flat bale form through the use of an ordinary press found commonly in gin houses. The original cotton before cleaning, graded below Good Ordinary and the cleaned cotton and matched bale graded Strict Low Middling.

The test showed that the visible waste in the original cotton was 13.58 per cent; in the cleaned, 7.73 per cent; and in the matched, or bale of equal grade which had not passed through any cleaning process, was 6.90 per cent. The cleaned cotton produced on an average a 5 per cent weaker yarn than the original, but 17.1 per cent stronger than the matched bale. This weakness of the matched b is probably accounted for by the character of the cotton in the bale selected.

Test No. 2 on Reginned Cotton: The machinery used in the process through which this cotton had passed closely resembled the usual battery of gins. In each machine, however, the grids or ribs and breasts are removed, the cotton being fed to the saws through feed rolls that are adjustable for various lengths of staple. The lint is removed from the saws by an air blast instead of by a rapidly revolving brush. The reginned product was also put up in the regulation flat-bale form through the use of an ordinary "square" press. The original cotton before cleaning consisted of a mixture of three bales, two of which graded Strict Good Ordinary and one Good Ordinary shy, while the reginned cotton and matched bale both graded Strict Low Middling.

The test showed that the reginned cotton gave off 3 per cent less visible waste than the original cotton, and 1 per cent less than the matched. The total visible waste on the original was 9.98 per cent; on the reginned, 6.98 per cent, and on the matched, 7.94 per cent. The reginned cotton produced on an average 5.88 per cent stronger yarn than the original but 14.48 per cent weaker than that produced from the matched or equal grade. The character of the cotton in the matched bale perhaps had some effect on the greater breaking strength shown by the yarn produced from the matched bale.

Test No. 3 on Reginned Cotton: The process through which this cotton had passed was very similar to that described in Test No. 2 but differs from it chiefly in that the cotton is removed from the saws through the use of a brush instead of by a blast of air. The original cotton before being reginned consisted of a mixture of three bales, two of which graded Strict Low Middling and one graded Middling, while the reginned cotton and matched bale both graded Strict Middling.

The test showed that the total visible waste on the original cotton was 6.63 per cent; on the reginned, 5.18 per cent; and on the matched or bale of equal grade, 8.34 per cent. The reginned cotton produced yarns 1.52 per cent weaker than the original and .21 per cent weaker than the matched bale. No suggestion is offered to explain why the matched bale showed a greater percentage of visible waste than the original cotton which was of lower grade.

The following table gives the total visible waste percentages and the breaking strength in pounds per skein for the three tests:

TABLE.

		Original Cotton	Cleaned or Reginned Cotton	Matched Bales
Test No. 1	Percentages of visible waste	13.58	7.73	6.90
	Strength of yarn in pounds per skein of 120 yards. 8s	223.4	211.7	193.2
	12s	143.4	137.5	118.9
	16s	104.0	100.3	85.8
	22s	71.8	68.5	56.4
	28s	44.1	40.8	33.4
Test No. 2	Percentages of visible waste	9.98	6.98	7.94
	Strength of yarn in pounds per skein of 120 yards.. 8s	198.7	204.9	234.4
	12s	124.6	130.8	152.7
	16s	92.7	98.0	115 2
	22s	60.8	66.7	79 5
	28s	41.1	42.1	51.4
Test No. 3	Percentages of visible waste	6.63	5.18	8.34
	Strength of yarn in pounds per skein of 120 yards.. 8s	237.0	236.9	238.7
	12s	153.9	150.0	151.0
	16s	112.2	110.4	110.9
	22s	77.6	75.8	75.7
	28s	45.8	45.3	45.0

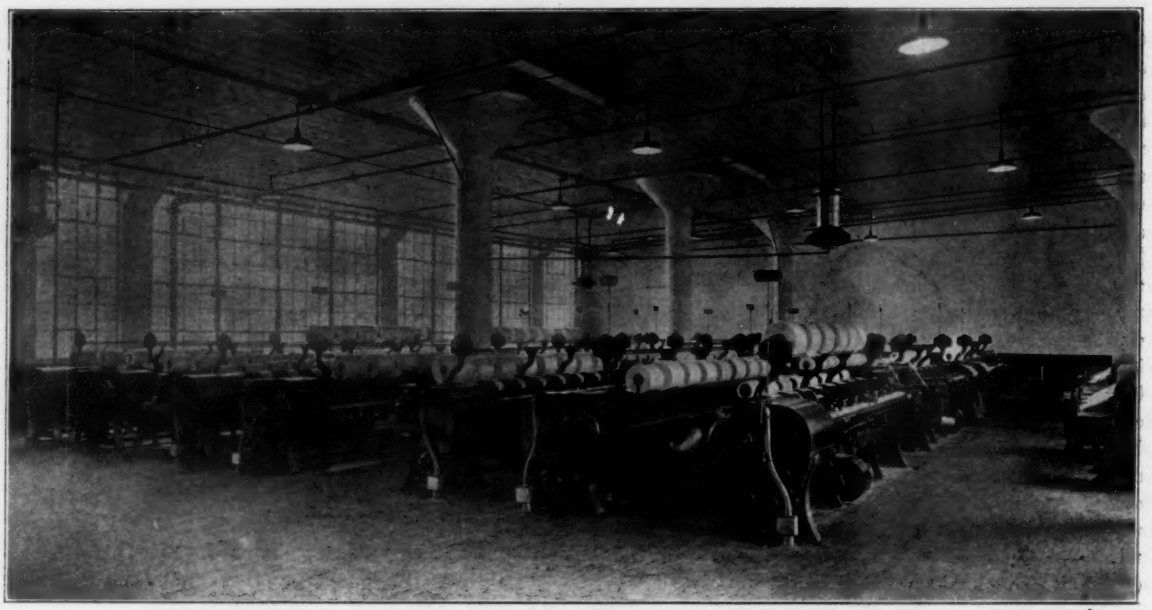
The visible waste and yarn strength results show that no definite conclusions can be drawn from these tests, hence these results should not be regarded as final.

The man who is afraid to make an enemy is hardly worthy of a friendship.

THATCHER SPINNING COMPANY, CHATTANOOGA, TENN. MILL NO. 2. 31,000 SPINDLES MAKING FINE COMBED YARNS.

The Thatcher Spinning Company, Chattanooga, Tenn., operates two mills adjacent to the Standard Processing Company, which also handles the output of the Coosa Manufacturing Company at Piedmont, Alabama. Both of the manufacturing plants of this organization manufacture yarns which are finished at the processing plant in Chattanooga. The capacity of the processing plant, after, a recent increase in equipment, is now 140,000 pounds of yarn on cones weekly.

The first building of the Thatcher Spinning Company—the No. 1 Mill—was designed and constructed in 1916.. During the year just passed, a second manufacturing unit, the No. 2 Mill, was completed and put into operation. This second plant is a noteworthy specimen of modern textile

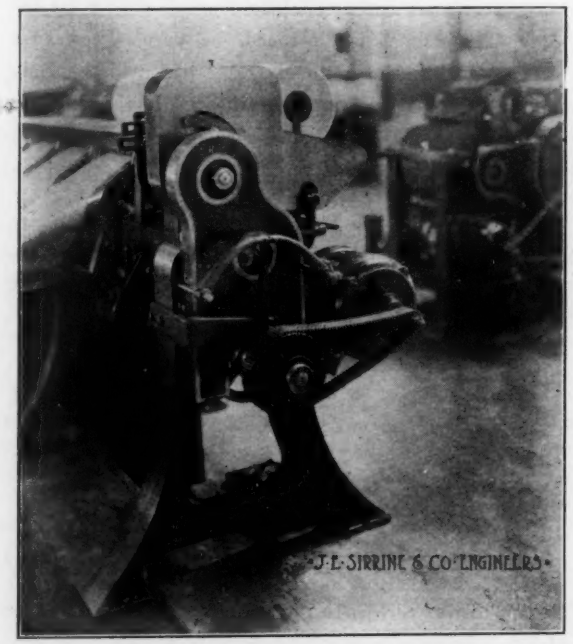


INDIVIDUALLY DRIVEN COMBERS AND LAP MACHINES AT THE NO. 2 MILL OF THE THATCHER SPINNING COMPANY.

mill building, and has been selected as an example in this description of modern mill engineering and construction.

This new spinning unit of the Thatcher Spinning Company is practically a duplicate of the original plant constructed five years ago, with the exception that it has a greater capacity; it is about fifty per cent larger. It contains 31,000 spindles, and the manufactured product is fine combed yarns. These yarns are made into balls by ball warpers, and are taken to the Standard Processing Company plant, where they are mercerized.

This new mill consists of a main mill building and a cotton warehouse building. The main building, where the manufacturing operations are carried on, is a three-story structure of re-inforced concrete construction. It is 309½ feet in length and 133 feet in width, and has a small base-



APPLICATION OF INDIVIDUAL MOTOR DRIVE ON RIBBON LAP MACHINE.

ment which forms the dust room for the picking machinery.

The latest of modern mill engineering practice was employed in the construction details of this building. The floors and roof are of flat slab construction. The floor slabs are 9½ inches thick and are covered with a layer of 1½-inch tarred sand on which a 2-inch sub-floor and a finished floor of 1-inch maple are laid. The roof slab is covered with a standard five-ply tar and gravel roof.

The walls and pilasters are of re-inforced concrete, and their arrangement, together with the Fenestra steel sash, provides a maximum area for natural lighting openings. Large skylights in the roof provide additional light and ventilation for the third or top story of the building, where the preparatory processes of manufacture are located. The bays are twenty-two feet wide and the divisions are twenty-six feet wide. Mushroom columns, on all floors, have a diameter of 20 inches.

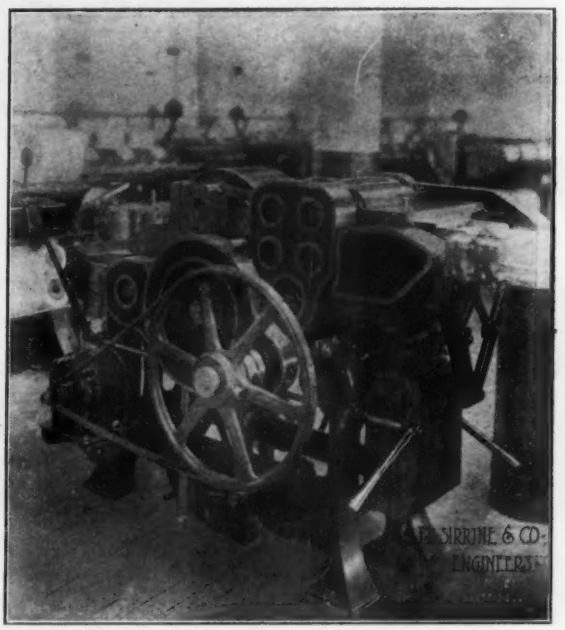
The appearance of the building is aided considerably by the construction of the corner towers, which are finished with brick veneer panels.

The building for cotton storage is likewise of flat reinforced construction. There are four stories to this building, which is 115 feet long and 62 feet wide. A part of the first floor of this building is utilized as an opening room, and this section has a ceiling height of 17 feet 3 inches. The ceiling height of the remainder of the first floor and of the three other floors is 9 feet. Baled cotton is carried from floor to floor by a simple elevator equipment.

In the manufacturing building, proper humidification is furnished by a Parks-Cramer humidifier system, with high duty heads and automatic control. Fire protection is provided by Grinnell automatic sprinklers, together with the regular complement of outside hydrants in hose houses. The primary water supply for the fire protection system is a 75,000-gallon tank located on a steel tower above the toilet tower, while connections with the city water system furnish the secondary source of supply.

Following the cotton on its journey through the mill, from the opener room on the first floor of the storage building it is blown to the picker room on the top floor of the main building. From this room the picker laps are taken to the card room, which is on the same floor. Here the cotton in process goes through the processes of carding, combing and roving frames.

In the form of roving, the cotton leaves the third floor and is carried by elevator to the second floor, which is com-



THE SLIVER LAPPERS ALSO USE INDIVIDUAL MOTORS AND CHAIN DRIVE.

pletely occupied by the spinning equipment. The yarn from this process is carried in the elevator to the first floor, which contains the spooling, twisting and warping machinery and the shipping department.

In reference to the twisting process, wet twisters are used in this mill, and the water supply and drain pipes for each twister are placed in the floor.

Individual motor drive is used on all machinery in this mill, with the exception of the cards and roving frames, which are driven by small group motors. The small illustrations herewith show the application of the individual drive principle on the combers and lap machines at this plant.

Transmission from the motor shafts to the driven shafts on the spinning frames, combers, spoolers and twisters is done by means of Link-Belt silent chains. The roving frames are driven by four-frame drive motors running at a full load speed of approximately 700 r.p.m. This slow speed motor allows the use of a reasonably large motor pulley so necessary on drives of this type.

Each line shaft in the card room is driven through a Link-Belt silent chain by a moderate size motor. Power is furnished to the plant by the Chattanooga Railway & Light Company.

The lighting system through the entire plant is direct, using 200-watt bowl enameled lamps and R.L.M. white enameled reflectors suspended by conduit, so as to give a mounting height of approximately fourteen feet above the floor. This provides a sufficiently uniform distribution of light, and also the high mounting removes the lamps and

INDIVIDUAL MOTOR AND CHAIN DRIVE APPLIED TO COMBERS.

reflectors from danger of breakage from stepladders or other similar causes. An automatic voltage regulator maintains constant voltage on the lighting system.

The engineering work for the complete plant was prepared and supervised by J. E. Sirrine & Company, Greenville, S. C., and New York City. The Turner Construction Company, of New York and Atlanta, were the general building contractors. The Chattanooga Railway & Light Company were the contractors for the electrical installation, and the electrical equipment was furnished by the Westinghouse Electric and Manufacturing Company.

The Saco-Lowell Shops, through their southern agent, Rogers W. Davis, furnished the picker room machinery, while practically all the other textile machinery installed was made by the Whitin Machine Works.

The Fenestra steel sash were made by the Detroit Steel Products Company; the elevators were furnished by the Park Manufacturing Co., Charlotte, N. C.; the sprinklers by the Grinnell Company, the humidifiers by the Parks-Cramer Company, and the chain drives by the Link-Belt Company, as indicated; the toilet fixtures were supplied by the Mott-Southern Company, Atlanta, Ga., and the toilet partitions by the Henry-Weis Manufacturing Company, of Atchison, Kansas.

Recollections.

Under this heading, Sir Charles W. Macara, Bart., perhaps the most prominent and important figure in the English textile industry during the last half a century, has written a very interesting book, in which he recounts some of his experiences during his long connection with the industry. In a reminiscent mood, he devotes the first chapters of the volumes to his early life, telling of his youthful ambitions and struggles, how Fate changed him from his early desire to become a soldier and placed him in the industry in which he later became so active and leading a figure.

This account composes only a small portion of the book, however, for in later chapters the author deals with important subjects that have come up in the industry in the last forty years and in which he played a leading part. Among these are the international movements in the industry, the International Cotton Federation, the International Institute of Agriculture, international delegations, and other subjects. An interesting chapter is devoted to the subject of strikes and how to prevent them, and other sections of the volume tell of interviews held by the writer with national and international celebrities on subjects of importance.

The material is prepared in a very engaging style, and is given additional value and interest because of the important role of Sir Charles in the campaigns and activities of the industry during the last forty years—his viewpoints on these subjects are very interesting and contain much logic and material for thought. The book contains 266 pages. COTTON's Book Department will order copies for any readers interested. Cassell & Co., Ltd., London, are the publishers.

A new color card for Sulphogene blacks has been issued by E. I. du Pont de Nemours & Co., Inc. The colors shown in the samples are Sulphogene Black AX, Sulphogene Black V, Sulphogene Carbon H, and Sulphogene Carbon 8G, and the shades produced by different quantities of dye to 100 pounds of material in standing bath are illustrated. This company has also issued color cards on a number of new colors developed by them. There are nine direct colors and two sulphur colors in this list. The direct colors include Pontamine Brilliant Green GX, Pontamine Violet N, Pontamine Fast Pink BL, Pontamine Blue BBF, Pontamine Brown CG, Pontamine Brown D3G, Pontamine Light Yellow 5GX, Pontamine Bordeaux B, and Pontamine Fast Red F. The sulphur colors are Sulphogene Green M. Concentrated and Sulphogene Carbon 8G Concentrated. On each card are a description and recommendations for the use of each color, as well as dyeing instructions.

The Design and Manufacture of Fustians

BY T. WOODHOUSE AND A. BRAND.

As has already been indicated in a previous paragraph, somewhat severe limitations are imposed upon the designers of ornament suitable for Jacquard or dobby figured velveteens; these limitations are entirely due to the specific nature of the cloth structure. There are, however, at least two other methods of producing fancy velveteens where the restrictions are less stringent, although the fabric produced may not be so satisfactory in other respects. The two methods are:

1. Embossing, and
2. Printing,

while occasionally the two processes may be combined.

Embossed velveteens may usually be regarded as cheap imitations of Jacquard figured fabrics. They are usually self-colored, i. e., dyed in one color only, and in structure they are identical with any of the ordinary velveteen textures. Indeed, they are actually ordinary velveteens upon

FIG. 20.

which an ornamental design is impressed by a process of embossing; the weave structure and the ornament are totally independent.

Plain velveteen cloth is subjected to great pressure by a roller on the surface of which recesses are made to correspond to the figure of the pattern, and hence the *ground* of the pattern is produced in high relief on the roller. The result of this pressure is to force the pile filling tufts into the body of the cloth in order to form the ground portion, and to leave the pile tufts untouched, i. e., in their natural erect condition, for the figure portion. A small sample of such an embossed pile fabric is reproduced in Fig. 20. These fabrics almost invariably have a rich satisfying appearance when new or unused, but the pattern becomes indistinct after the cloth has been in use for some time, and finally may become completely obliterated in places, in virtue of the ground portion being comparatively easily disturbed by frequent handling or rubbing.

In the case of printed velveteens, elaborate color effects calculated to produce a rich complex looking fabric, can be carried out with comparative ease and at a reasonably low cost of production. As is the case with the embossed variety, ordinary velveteen forms the basis. Fig. 21 is a photographic reproduction of two small portions of a printed velveteen in which at least five colors can be easily distinguished, viz., green, yellow, and three shades of brown. The lower piece shows a comparatively large amount of the ground as well as bits of the figure. The weave structure is that of an ordinary velveteen, and is identical with that shown in Fig. 22, where the design A shows four repeats of the unit weave. It will be seen that

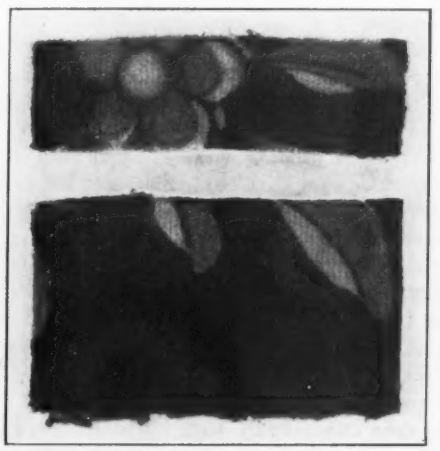


FIG. 21.

the weave is a 9-thread by 15-pick twill back velveteen, in which the filling is inserted in the order of 3 picks of pile to 1 pick of ground.

The ground weave is the 2 up 1 down twill to right, while the pile picks are stitched or bound on alternate warp threads.

Comparatively good quality cloths are essential to get solid color effects, and to prevent small details such as stems, the veining of leaves, etc., from becoming indistinct. The patterns shown in Fig. 21 have 90 threads per inch in the warp, and 428 picks per inch of filling, both quantities being taken from the finished cloth.

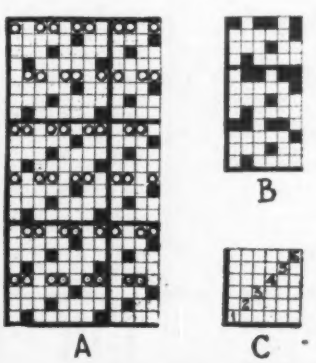


FIG. 22.

In addition to the usual finishing processes, a slight nap is raised on the back which gives the fabric a full soft handle. One weaving plan for this fabric appears at B, Fig. 22, from which it will be seen that six harnesses are necessary with a suitable tappet driven at a speed of one revolution for fifteen picks; the corresponding straight draft is indicated at C in the same figure.

Very elaborate and beautiful fabrics can be obtained by the printing process, as machines may be made to manipulate rollers for 8, 12, 16 or even as high as 20 colors. It will thus be seen that so far as color is concerned, the designer has a very wide range at his command, although it must be remembered that the cost of printing, and hence the value of the fabric, naturally increases with the number of colors employed. It is a common practice to use a dyed fabric on the printing machine, using a color which is light, and which plays its own particular part in the final scheme of color ornamentation. The darker colors are then applied by the printing machine.

Another common and somewhat similar method is to have the ground color padded, i. e., printed all over with a light tint from one coloring roller in the machine, after which the remainder of the pattern is produced in the usual way. The printing machines require one roller for each particular color used, but extra colors can be obtained by superposition, i. e., by printing one color on the top of another, and thus obtaining a new color, or rather one which is distinct from any of the individual color liquids employed. For instance, red might be printed on the top of blue to obtain a purple shade, or blue on the top of yellow to obtain green; in general, however, this method should be avoided, as it requires a great amount of skill and experience to produce satisfactory results. It can only be done satisfactorily when the constituent colors are kept intimately mixed by agitators or other devices.

The foregoing descriptions cover practically all the usual types of velveteens, and this section of the work may be fittingly concluded by a more or less extended reference to the methods of altering the density of the pile in fabrics of a similar quality and make. By similar quality and make we desire it to be understood that in the cloths under comparison there are the same counts of warp and filling and the same setts (thread and picks per inch), as well as the small ground structure and the same length of pile filling float with a consequent similarity in the height or depth of the pile.

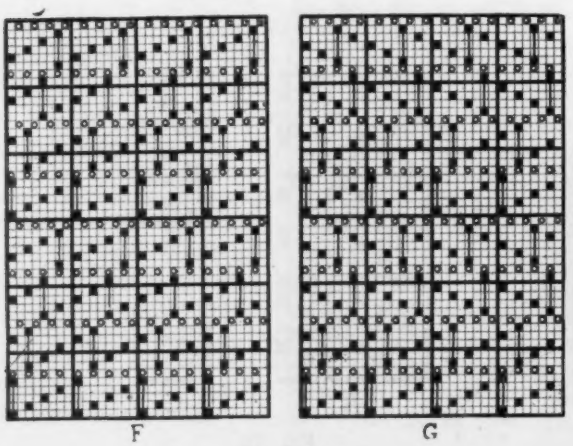


FIG. 24.

The 8-thread by 10-pick velveteen weave shown at A, Fig. 23, for instance, when woven in particular setts with certain counts of warp and filling will produce a fabric having a particular density of pile. It may become necessary or desirable to produce a range of fabrics of similar quality, as per above conditions, but with a more dense or less dense field of pile tufts. In obtaining these desiderata, there is but one fundamental principle to apply, but there are at least two common ways of applying the principle.

The underlying principle in the alteration of the pile density is that, with given setts and counts of warp and

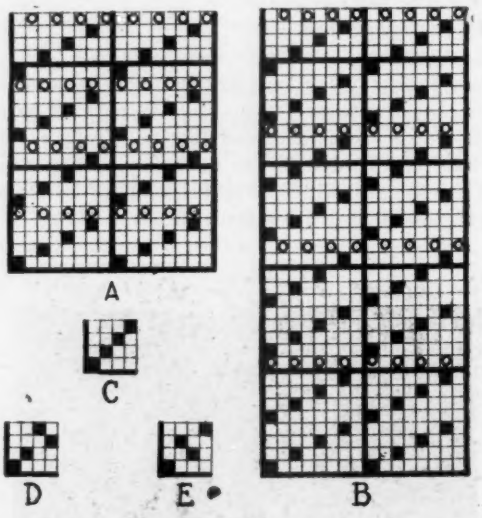


FIG. 23.

filling, the density can be altered only by changing the proportion of pile picks to the total picks in one unit of the weave. The point paper designs in Figs. 23, 24 and 25 have been specially prepared to illustrate the various methods employed.

The 8-thread by 10-pick velveteen, of which four repeats appear at A, Fig. 23, is capable of being woven with five harnesses, and with the picks inserted in the order and proportion of four pile picks to one ground pick. Alternate warp threads are employed to stitch in the pile filling, the floats of which extend over seven warp threads, and thus form pile tufts with a nominal height of 3½ threads. (The bend round the thread is neglected.) The stitching points are in such a position relative to each other and to the ground picks as to form one complete row of pile tufts between each pair of ground picks. The density of the pile for such a structure may be regarded as 100

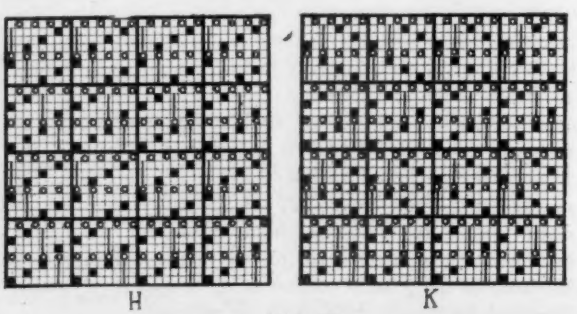


FIG. 25.

per cent for comparative purposes; that is to say, for a base of standardization it is assumed that when eight out of ten picks are used for pile, the density may be considered as being equal to 100 per cent.

One method of increasing the density is indicated by the weave B, Fig. 23, which gives four repeats of a velveteen, producing the same depth of pile as the weave A in the same figure. The main differences between designs A and B are:

1. Design A has 10 picks to the round, while design B has 18 picks to the round.

2. There are four pile picks to one ground pick in A, while there are eight pile picks to one ground pick in B.

3. Design A has one row of pile tufts between each pair of ground picks, while design B has two rows of pile tufts between each pair of ground picks. The eight picks in the latter design constitute two groups of four pile picks in each, each group forming one row of tufts. It will be seen that in design B, 16 out of every 18 picks are pile picks. The pile density compared with design A is therefore—

$$\frac{100 \times 16/18}{8/10} = \frac{100 \times 16 \times 10}{18 \times 8} = 111\ 1/9\%$$

that is to say, by altering the weave from A to B, a pile is produced which is approximately 11 1/9 per cent more dense than the standard. The method indicated produces quite a satisfactory fabric so far as the pile is concerned; the ground fabric is, naturally, not so satisfactory. One defect of the method is that the pile density can be altered only by comparatively large steps and when smaller steps are required, advantage must be taken of a second method.

The design marked F, Fig. 24, shows eight repeats of a similar velveteen weave to A, Fig. 23, but arranged to give the minimum increase in density. It will be noticed that the pile picks are inserted in groups of five, although the repeat of the pile portion is on four picks. This method results in one thread in each group, or two threads in one unit weave, carrying two pile tufts instead of one. Attention has been drawn to these particular threads in the design F, Fig. 24, by inserting short lines connecting the two stitching points on the common thread in each group. This peculiarity is, indeed, the chief defect of this method, since the regular occurrence of the double tuft produces an oblique lined effect across the surface of the fabric. Because of this defect, the particular weave illustrated at F is seldom if ever used, its place being taken by the slightly different design indicated at G in the same figure.

Comparison of these two designs F and G will show that they are similar in all respects but in the position of the double tufted threads. In design F these threads may be regarded as being in 4-thread straight twill order, similar to the unit twill weave C, Fig. 23; whereas in design G, Fig. 24, the threads may be considered as being in 4-thread broken twill or semi-sateen order (1, 2, 4, 3) exemplified by the unit weave D, Fig. 23. The unit weave E, Fig. 23, arranged in the order 1-3-2-4 may be used alternatively to D, but the results will be identical. This method of arranging the extra tufts prevents any definite lined appearance, and retains the usual all-over effect. The comparative density of the pile produced by this method, relative to that obtained by weave A, Fig. 23, may be obtained as follows: there are 20 pile picks in every 24 picks in weaves F and G, Fig. 24, and 8 pile picks out of every 10 picks in weave A, Fig. 23, so that—

$$\frac{100 \times 20/24}{8/10} = \frac{100 \times 20 \times 10}{24 \times 8} = 104\ 1/6\%$$

i. e., the pile is 4 1/6 per cent more dense with weaves F and G, Fig. 24, than with weave A, Fig. 23.

A variation of the method used in Fig. 24 is employed when it is desired to decrease the density of the pile. The designs in Fig. 25 show the method of effecting the minimum decrease in the density of the pile—weave A, Fig. 23, being again taken as the standard of comparison. Point paper design H, Fig. 25, shows eight repeats of a weave similar to A, Fig. 23, but with three pile picks per group instead of four. It will be observed that one thread in each group carries *no* tufts; these threads are indicated by vertical line. The points at which the tufts are omitted form oblique lines across the surface of the cloth, and, consequently, to destroy or prevent this twilled effect, design K is brought into use. In design K, as in design G, Fig. 24, the particular points in threads where the alteration occurs are arranged in 4-thread broken twill order so as to retain the usual all-over effect of the velveteen weave. The comparative density of the pile produced relative to that given by design A, Fig. 23, is obtained as follows: (note that there are 12 pile picks in every 16 picks.)

$$\frac{100 \times 12/16}{8/10} = \frac{100 \times 12 \times 10}{16 \times 8} = 93\tfrac{3}{4}\%$$

i. e., by altering the weave from A, Fig. 23, to K, Fig. 25, the density of the pile is reduced from 100 per cent to 93¾ per cent, or a reduction of 6¼ per cent.

(*To be Continued.*)

Thin Boiling Starches.

(*Continued from page* 172.)

Under normal conditions the greater the strength and the greater the elasticity the smaller the number of breaks, and breaks make seconds, so that an increase of strength in the warp of 12 to 15 per cent makes quite a remarkable decrease in the amount of seconds produced by the loom.

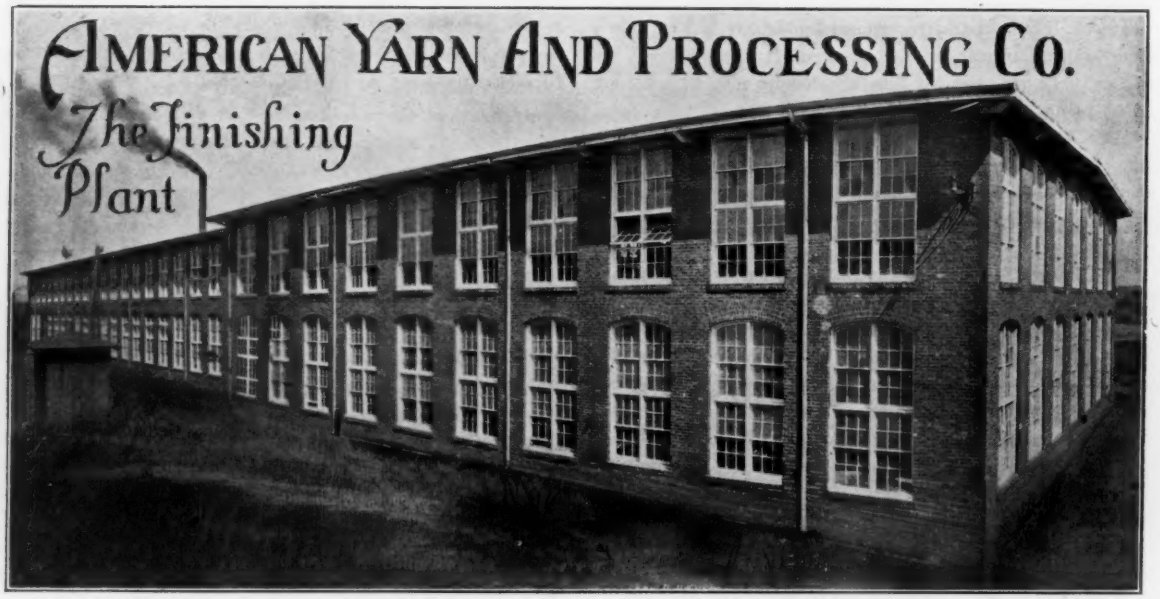
Looked at in another way the use of thin boiling starch in the slasher box will make a short fibered cotton as strong as those spun from longer fiber. Also, because of its penetration, it does not dry with a hard, brittle crust on the surface of the yarn, as does ordinary pearl starch, but instead drys into a flexible finish which gives a "soft, pleasant" feel to the finished goods.

These numerous advantages are particularly apparent in the manufacture of print and similar goods, and in heavier weaves the advantages persist but to a lesser degree.

In conclusion, by using well-made thin boiling starches, first, we decrease shedding 50 per cent. Second, increase the strength of the yarn 12 to 15 per cent. Third, decrease breakage 50 to 75 per cent. Fourth, decrease production of seconds in proportion. Fifth, give a soft, agreeable finish to the goods.

If you want to get ahead, use the one you've got.

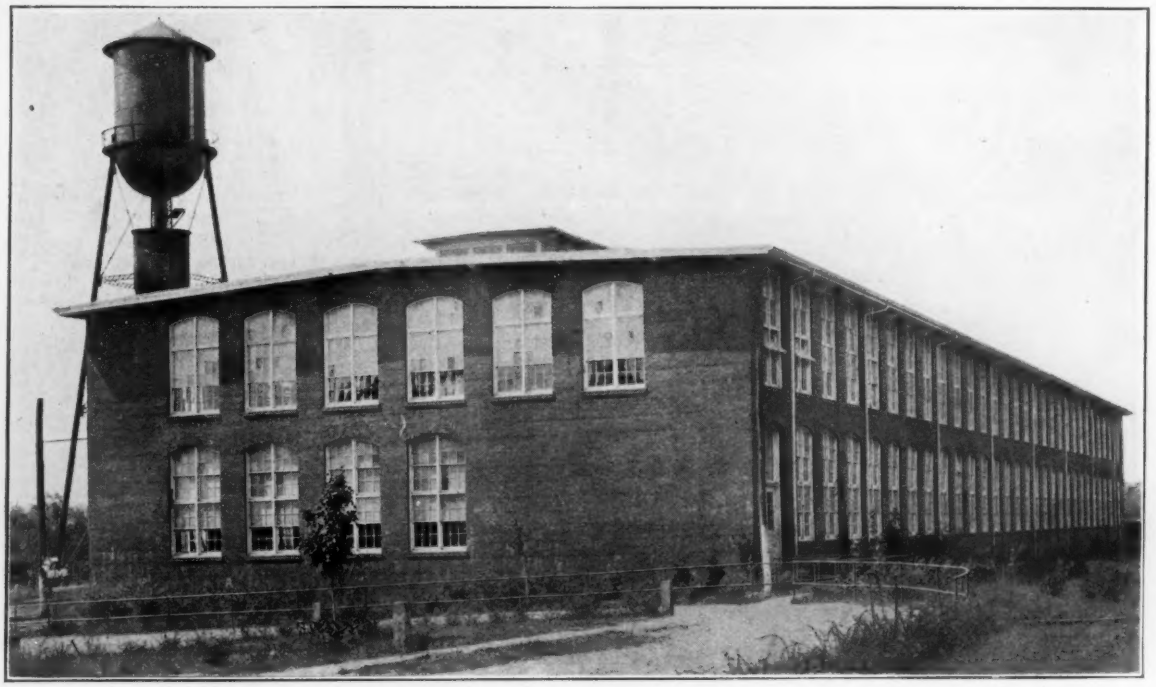
AMERICAN YARN AND PROCESSING CO.



Organized a number of months ago to succeed five yarn mills and a finishing plant, the American Yarn and Processing Company, at Mt. Holly, North Carolina, occupies a prominent place in southern textile manufacturing. This organization controls the fine yarn mills at Mt. Holly, formerly operated as the Adrian Manufacturing Co., the Alsace Manufacturing Co., the Nims Manufacturing Co., and the Woodlawn Manufacturing Co., and the finishing plant that was formerly known as the American Processing Company. Also, the Union Cotton Mills, at Maiden, North Carolina, have been taken over by this organization, and at this writing, machinery is being installed in a new plant at Mount Holly, which is to be known as Union Mill No. 2, and which will make a total of six yarn mills and one finishing plant included in this organization.

The product of the American Yarn and Processing Company is high-grade mercerized combed and carded yarn, furnished in warps or skeins or on tubes or cones, and ranging from 16s to 80s, single and ply. The spinning mills of the organization furnish the manufactured warps to the finishing plant, where they are prepared for knitting and other purposes.

LOOKING DOWN ONE SIDE OF THE MERCERIZING ROOM.



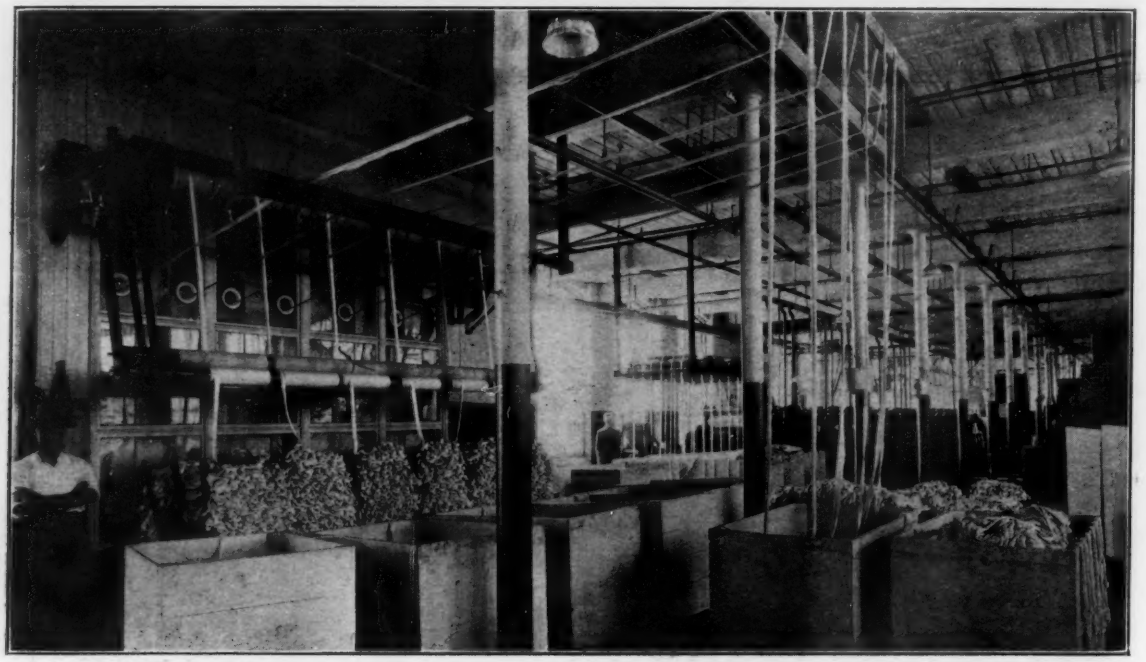
THE ADRIAN MILL AT MT. HOLLY, N. C.

In order to accomplish the purpose of this entire organization—the making of high-class mercerized yarns—one of the most essential requirements is an up-to-date, modern, efficiently operating mercerizing plant, and for efficiency, completeness and quality of product, the finishing plant of the American Yarn and Processing Company, handling the yarns from its own mills, is accorded to be one of the foremost plants of its kind in the country. It is chiefly with this finishing plant that this account will deal.

The yarns are received in warps from the spinning mills, which are a part of the same organization, and also warps are brought from other mills and processed at this plant. This practice came after the finishing plant had reached a greater capacity than the company's mills were able to fill. However, the corporation will in the next thirty days have two additional spinning mills in operation on combed yarns, which will enable it to furnish practically all of its own spinning for mercerizing.

Every warp, upon its arrival at the finishing plant, is checked and weighed, and is properly tagged and dated, and this system is followed throughout the process, so that

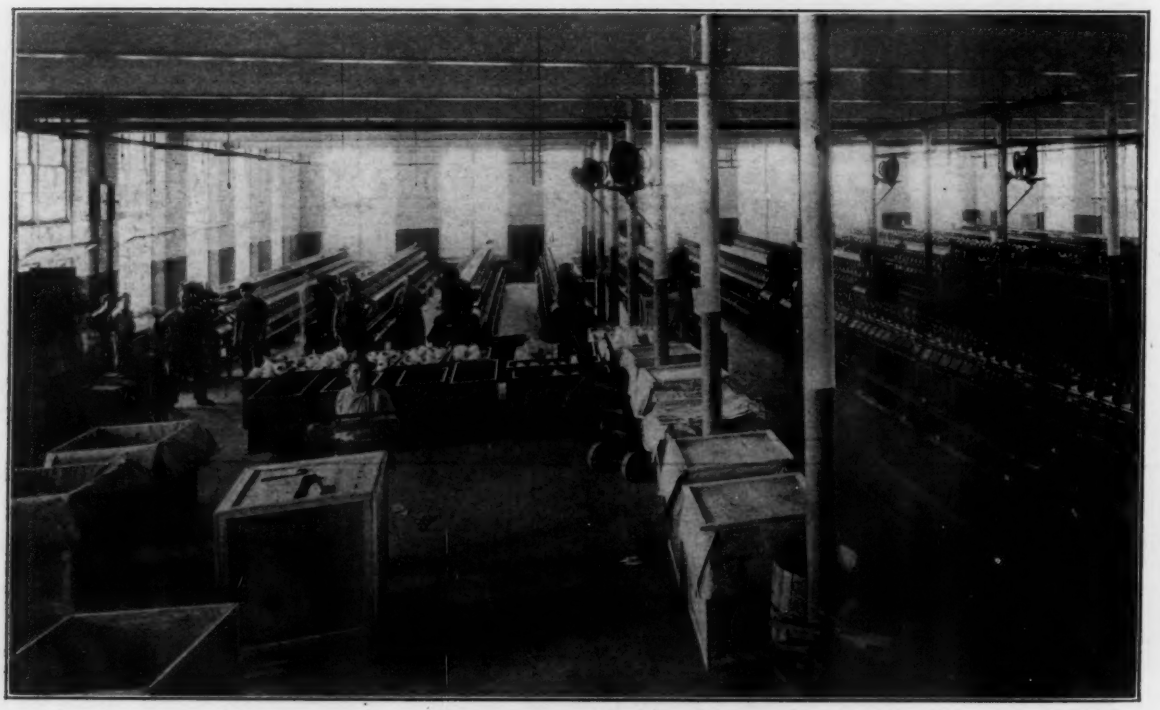
THE ALSACE MILL, MT. HOLLY, N. C.



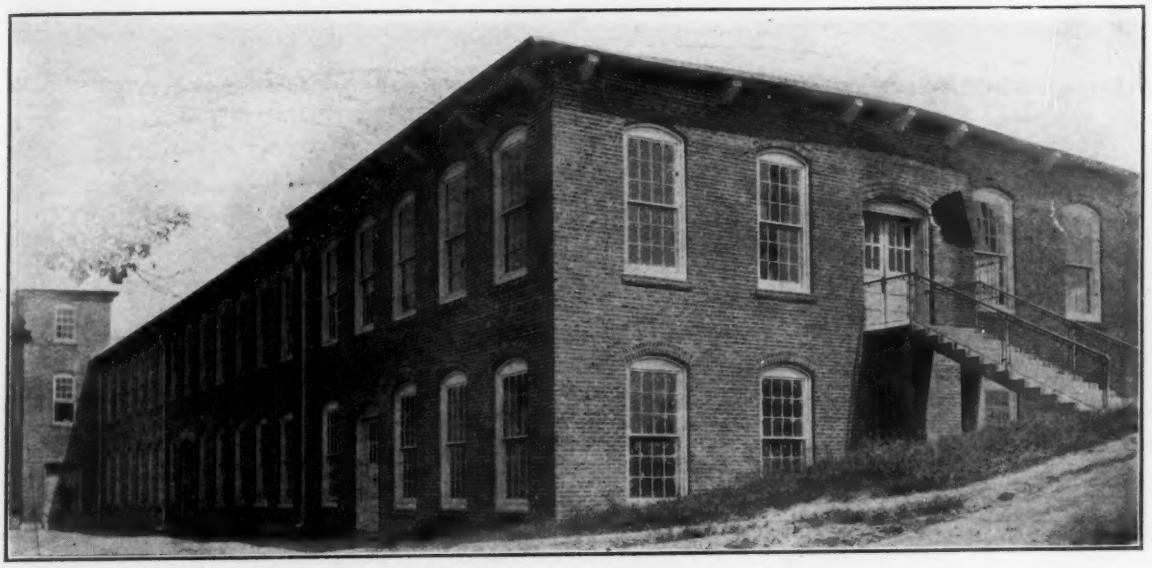
ANOTHER VIEW OF THE MERCERIZING ROOM SHOWING DRYING MACHINE AT THE LEFT.

at any time during the mercerizing process it is easily possible to ascertain from what mill a certain warp was received, the date of its receipt, etc.

Next, the warps, which are of the ball or long chain type, are placed on a rack at the back of the mercerizing machine proper, and the machine is "threaded up" for the process. Fifty-four strands are put up at a time, and these strands are run over a roll onto a preliminary machine which consists primarily of a series of oscillating bobbins of yarn, which pass around the warp strands as they pass through the machine and wrap a string around the strands, binding three into one with medium yarns and four into one with fine yarns. This is done to hold the strands intact and prevent the warps from becoming steam blown in the boiling vats. After the yarn has passed through the various vats of boiling water, chemicals, acids and cold water, it is taken to a vertical drying machine. This machine contains 18 dry cans, and the yarn is



A CORNER OF THE WINDING ROOM.

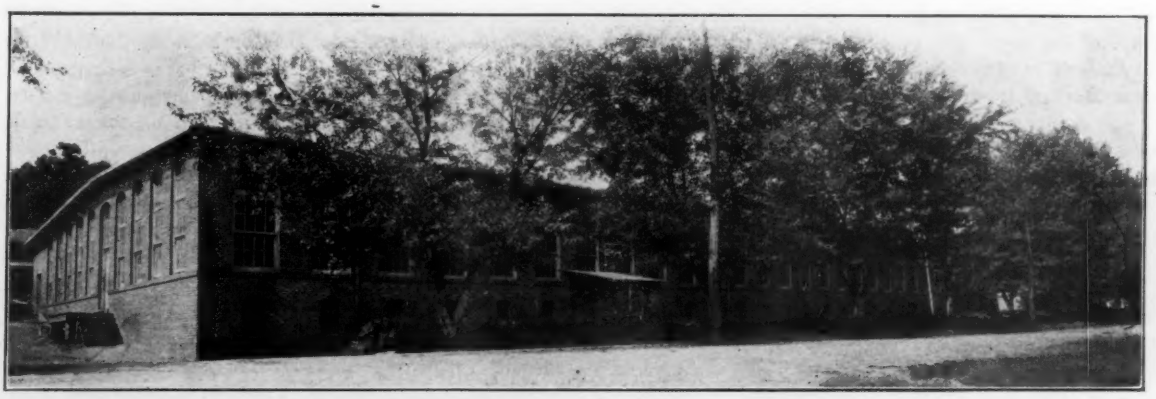


THE NIMS MILL, MT. HOLLY, N. C.

passed around the dry cans fifteen times to insure a thorough drying. The machine will dry from eighteen to twenty-four warps at a time. The mercerizing and drying machinery was manufactured by the Textile Finishing Machinery Company of Providence, R. I.

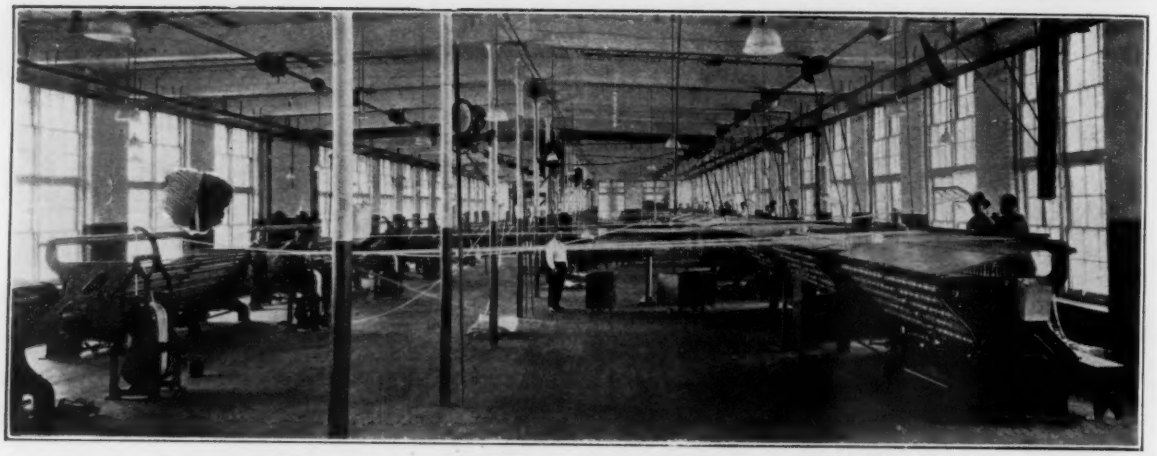
The yarns go from this drying machine upstairs to the quiller room, where the binding threads are removed and the warps are passed through the separating or splitting machines. The purpose of these machines is to again separate the warps into different cans for the next operation: quilling. Also, as this machine removes the string that was placed around the warps at the beginning of the mercerizing process, this string is re-wound onto bobbins and may be used over again.

As stated, the yarn goes from the splitting machines into separate cans, and from these it passes to the Whitin



THE WOODLAWN MILL, MT. HOLLY, N. C.

UNION COTTON MILLS, NO. 2, MT. HOLLY, N. C.



THE QUILLER ROOM.

quillers, made by the Whitin Machine Works, of Whitinsville, Mass.

The quillers put the yarn on bobbins ready for the winding operation. The cans from which the quillers are fed, and which hold the warps coming from the splitting machines, are tagged, the tags giving the amount of yarn, the style, and the number, also supplying the date, the name of the mill where the yarn was made, etc.

These tags are made in two sections, separated by a perforated line. As an operator finishes a can, he removes one section of the tag, which contains the amount of yarn that has been quilled, and the remainder of the tag goes on with the yarn. The operators are paid according to the total of the tags which they hold at the end of the week.

After it has been quilled, the yarn is taken downstairs on a Moffatt elevator to the winding room, where it is put on cones and made ready for shipment. The winders were furnished by the Foster Machine Company, Westfield, Mass.

The tag system of payment is continued at the winders, as well as the system of checking up on the identity and source of the yarn being wound.

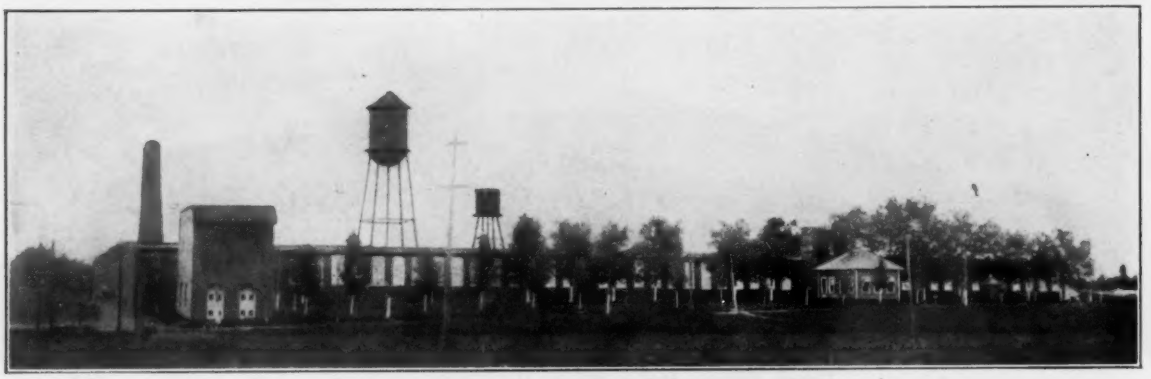
From the winding operation, the cones of yarn are taken to the wrapping table, where each cone is tagged with the number and style of yarn it contains, the number of the operator by whom it was wound, etc., and then each cone is wrapped separately. The cones are then packed in wooden cases for shipment, which are marked with the number and style of yarn, the mill from which they were secured, etc. The cases are then taken on to a large Toledo floor scale, where they are weighed. The weight of the case, paper cones and wrapping paper are deducted as tare, and all yarn shipped and invoiced at net weight.

The cases of yarn are then stored, and await the shipping clerk with his instructions, having been suitably marked with all the information necessary, with the exception of the customer's name and address.

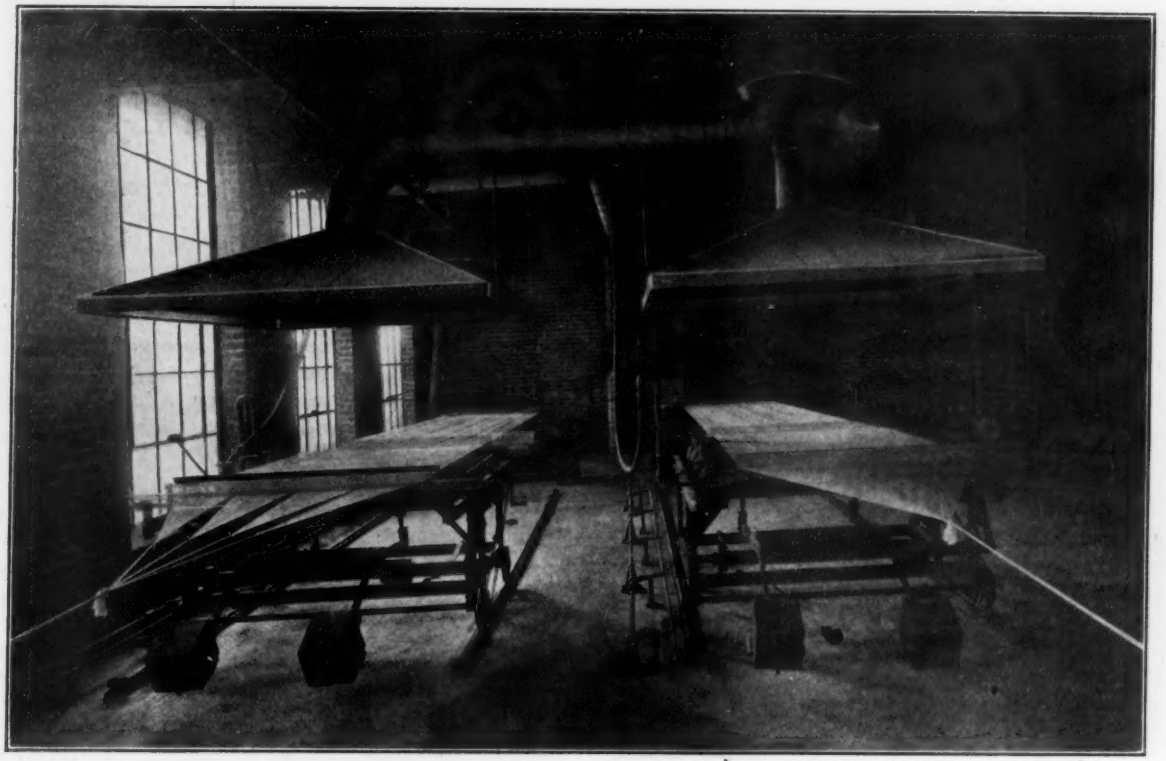
One especial feature of the practice of this plant is the fact that "weaver's knots" are used throughout every operation. As a large percentage of the yarns going through this plant are for knitting purposes, this is a desirable feature, as this type of knot will pass through the eye of the knitting needle much more easily than will the ordinary square knot.

The chemicals used in the mercerizing process are received in a separate room at one end of the building, where they are prepared for use in the process. The caustic soda is received at the plant in 750-pound cans, and these cans are torn away from the chemical, which is then placed in the dissolving kettle, located on the second floor of the building, by means of a crane. After it has dissolved, which action is accomplished by a steam boiling process, the liquor is then run downstairs into the liquor tank, where it is kept at a specified temperature, by means of water coils that are run through this tank.

The sulphuric acid that is used in the mercerizing machine is received in the chemical room in carboys. It



UNION COTTON MILLS, NO. 1, MAIDEN, N. C.

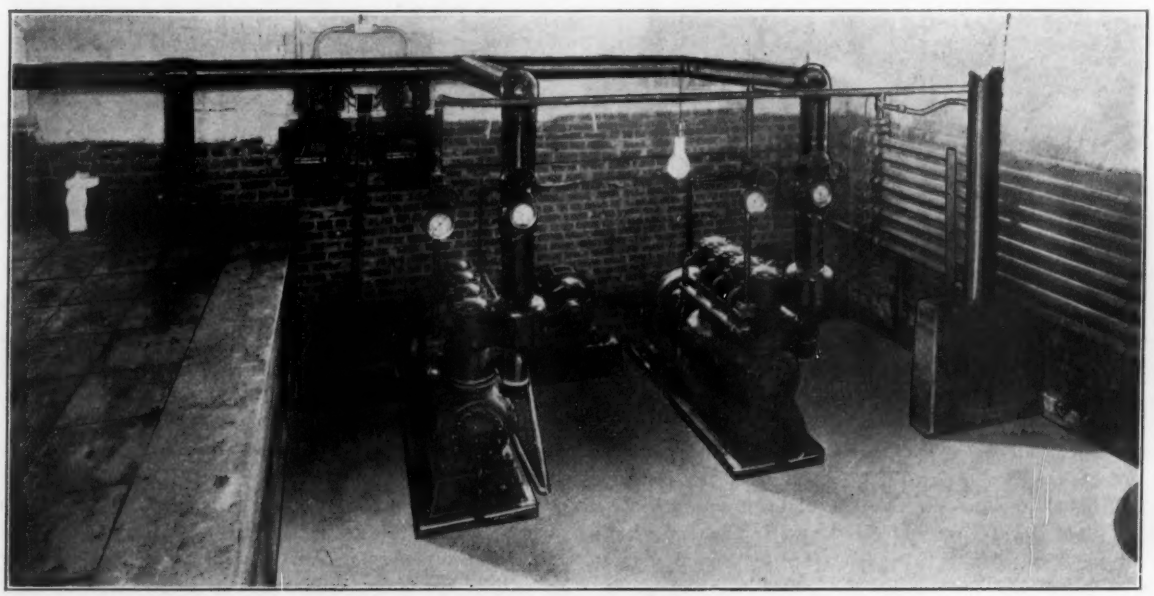


TWO OF THE GASSING MACHINES.

is emptied from these into a tank from which it is transported to the mercerizing machine through a lead pipe in a pipe conduit packed with cork which also contains the caustic liquor pipe. This conduit runs just under the floor level in the mercerizing room, and the flooring over the cork insulation is made up of short sections, so as to make any section of the pipe lines easily accessible in case of repairs or other adjustments.

As indicated, the temperature of the caustic soda mixture is kept constant as it is sent to the boxes in the mercerizing machine; this is a most important feature.

To accomplish this necessity, this organization operates its own refrigerating plant for this purpose. This refrigerating equipment, which was manufactured and installed by the Southern Ice Machine Company, of Charlotte, N. C., is located in a separate building adjoining the power plant building. It is an efficiently operating plant, and as its production is considerably in excess of

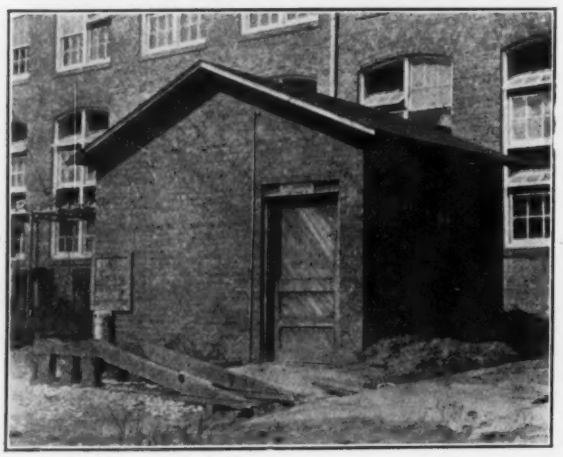


INTERIOR OF THE ICE PLANT.

the amount of refrigeration required for the brine circulation used in cooling the chemicals used in manufacturing, the excess is utilized in operating an ice plant.

In another smaller building, separated from the mercerizing plant itself, there are installed Foster gassing machines for use in singeing yarns on which this process is desired. These machines were manufactured by the Foster Machine Company. Each has a capacity of 240 yards of yarn a minute.

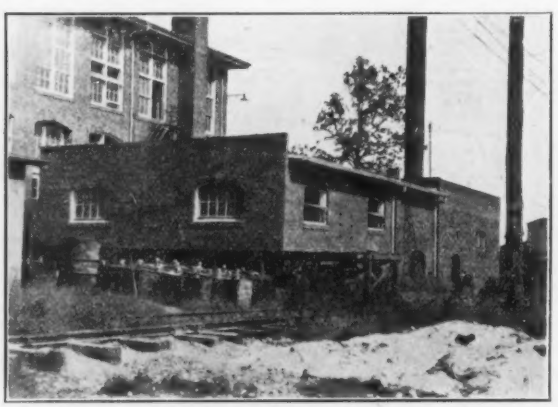
The gas necessary in this gassing or singeing process is manufactured by the mill in its own gas producing plant,



WHERE THE GAS IS MADE.

installed in a small house between the mercerizing building and the building which contains the gassing machines. This gas producing machine was manufactured by the C. M. Kemp Manufacturing Company, of Baltimore, Md.

The mill is equipped with Bahnson humidifiers, made and installed by the Bahnson Company, Winston-Salem, N. C. All of the machinery, with the exception of the dry cans, is electrically driven. This drying machine operates by its own steam engine, which allows a variable speed



EXTERIOR OF THE ICE PLANT AND BOILER HOUSE.

suitable for all weights of warps. The sprinkler system was installed by the General Fire Extinguisher Company.

So much for the processing equipment proper. Just up a slight elevation from the mercerizing plant is a large filter plant, which filters the water used in the processes at the mill and also that going to the houses in the village for drinking and household purposes. This filtration system was manufactured and installed by Hungerford and Terry, Philadelphia. Also in this building is a fire pump for fire protection purposes, manufactured by the Goulds Manufacturing Company. Morse silent chain drives are used on this equipment to connect the pumps and electric motors.

In connection with this filtering plant, there is maintained a large reservoir with a capacity of 100,000 gallons of water. This reserve supply may seem to be a little large, but the point is that there must be on hand at all times a supply of water sufficient to at least carry the plant through to the completion of any consignment of warps that may be in process on the mercerizing machine in case the original source of water supply should become exhausted. The reason for this is that should the goods be kept standing for a period of time in the chemical baths in the mercerizing machine, they would soon be damaged by the action of the chemicals.

In addition to this reservoir there is a large steel 50,000-gallon standpipe at the mercerizing plant, constructed

THE PUMP HOUSE AND FILTER PLANT.

and erected by the R. D. Cole Manufacturing Co., Newnan, Ga. This concern also manufactured the tanks erected at the other plants of the American Yarn and Processing Co., at Mt. Holly.

Because of the fact that the different plants of this organization are located at considerable distances from each other, a separate village is maintained for the employees at each mill. At the mercerizing plant, there are fifty-eight houses built and in process of construction. Each is equipped with electric lights, water connections and toilets. There are 125 people employed at the finishing plant who, with their families, occupy this village.

The Whitin Machine Works, Whitinsville, Mass., are distributing to friends and customers their calendar for 1922, which is of the same style as issued by this company in the past. The twelve photographs of this year's calendar are devoted to scenes of the plant of the company and views of Whitinsville, and the views of employees' homes and the Stevens house for works employees, as well as other views of Whitinsville, indicate that these textile machinery manufacturers, like the industry with which they are allied, are taking an interest in the welfare of their workers.

Slashing Cotton Warps

BY WILLIAM B. NANSON.

Cylinders must be kept clean. New cylinders should be rubbed with tallow to prevent the yarn from sticking. It is also advisable to treat the old cylinders in this way once in a while, especially if there is not much softening in the size.

The winding of the yarn on the loom beams must receive constant attention, not only to see that the sheet of warp is spread evenly by means of the expansion comb so as to form a smooth surface across the entire beam without ridges, and that the yarn fits snugly against the beam heads so as to avoid making too hard or too soft edges to the warp beam, but also to watch the tension drive, so that it shall be at all times great enough to wind the yarn tightly on the beam but not sufficient to put such tension on the threads as to weaken or break them. A well made beam should be perfectly hard and round, especially near the heads. A soft end to a beam is a great nuisance to a weaver.

The section beams on the creel require watching so as to detect as early as possible the breaking of any end, which is indicated by a lap on the beam, which becomes more prominent as the other ends unwind. This lap should be promptly cut off and the broken end allowed to pass forward and placed in proper position in the comb at the front of the slasher.

When replacing broken ends or performing other operations in connection with a running slasher, it is advisable to run the machine with the belt on the slow pulley. If the steam valve to the cylinder is not automatically closed, as it should be, at the same time that the belt is moved to the slow motion pulley or to the loose pulley, the tender must shut off the steam and watch the warp on the cylinder to see that it does not become burned.

When the slasher is stopped at night it is important that the size rolls and squeeze rolls should be washed with cold water. If this water contains a little disastafor to dissolve out the size from the slasher cloth it is better. The size in the box should be drawn off and returned to the kettle. If, however, it is left in the box it should be covered with a thin layer of water or oil and the immersion roll should be raised up out of it. The squeeze rolls should be raised out of contact with the size rolls, and the steam should be entirely shut off from the cylinders.

Sometimes, in order to divide the warp into tapes so as to facilitate the filling of the expansion comb at the slasher head, a striking comb with as many teeth as there are in the expansion comb is pushed through the sheet of warp just before it enters the size box at the beginning of a set, and held there while a few yards of warp pass through it. This causes the warp to be sized in tapes, and one of these tapes is placed in every space in the expansion comb; this being done before the split rods are inserted. This saves time, but in the opinion of the writer, it is of doubtful desirability.

Sizing Materials.

To obtain the best results on slashing we must use the most suitable starch or sizing compounds, be careful that the time of boiling and the temperature of the cooking is right, get the right "set" or pressure on the squeeze rolls and the size in the size box at the right heat. The details of what is best will vary somewhat with the locality and the overseer in charge in each mill, but in a general way the principles involved are the same for all.

Among the starches most generally used, I shall speak only of wheat flour, corn, potato and sago starches.

Wheat flour. This is not as much used now as it was in the early days of cotton manufacturing. As a matter of fact, there are so many objections to its use, though it makes a good sizing medium, that the writer does not advocate its use under any circumstances and so will not discuss its use here.

Corn starch. This starch is being used successfully in sizing for all classes of work at the present time. The manufacturers of corn starch are placing a more superior product on the market than formerly, and most of the objections to the use of this substance have disappeared.

Formerly the complaint was made of corn starch that it produced a very harsh feeling yarn, and no reasonable amount of fatty substances rendered it sufficiently pliable for good weaving. Improved processes of manufacture, however, appear to have removed the various objectionable features, and corn starch holds a high place in sizing today.

It is important that corn starch should be treated in a suitable manner in order to get the best results. The mixing should in all cases be well boiled in order to thoroughly gelatinize the starch granules. Caustic soda may be used with corn starch in pure sizing in order to bring about the complete gelatinization of the starch granules.

When corn starch was first introduced for sizing purposes, complaints were made that it did not produce a paste sufficiently adhesive to fix china clay. The reason for this was that those who used it did not give it the required amount of boiling, and consequently the clay dusted off in the weave room. Corn starch also got a bad name because the insufficiently boiled size was rubbed off by the friction of the reeds and harnesses, which weakened the yarn. Trouble of this kind has been overcome by treating the starch in such a manner as to render it suitable for all classes of work, hence we have on the market "thick" and "thin" boiling starches, etc.

Corn starch produces a very thick size and this leads to trouble if the size is allowed to remain overnight in the pipes leading from the mixing tank to the size box. As the size cools it sets very thick and the pipes become plugged up. To obviate this a steam pipe should be connected to the supply pipes in such a manner that they can be blown clear whenever the slasher is stopped.

Yarn sized with a mixture containing corn starch possesses a firm feel which is imparted to the cloth.

I would say here that there is a popular superstition that corn starch is only suitable for coarse yarns and that potato starch is the only correct thing for fine yarns. This is very much of a fallacy. Thin boiling corn starches or tapioca may be used to advantage in place of potato which latter is an unreliable proposition anyway.

When speaking of starch pastes, the terms "viscosity"

and "fluidity" are both used. A high viscosity means a low fluidity and vice versa. Hence, because potato starch possesses a higher viscosity under certain conditions than corn starch possesses under similar conditions, it is argued that potato must be the better starch, whereas the fact is that any given values for fluidity or viscosity are always relative and never absolute. Comparative tests must be made with the same individual instrument and under absolutely the same conditions as to temperature, time and concentration.

If corn and potato starches are boiled under precisely similar conditions, the potato starch, after boiling five minutes, attains its highest viscosity which is higher than the corn can ever attain, but the corn starch has to be boiled for thirty minutes to attain its highest degree of viscosity, which is lower than the potato at its highest viscosity mark, but there is this difference: after five minutes the potato deteriorates and goes thin while the corn changes but little. In other words, if equal quantities of potato starch and corn starch be boiled in separate and equal quantities of water for thirty minutes, the resultant pastes are practically of the same degree of thickness—the potato starch has been reduced in viscosity by the continuous boiling and the viscosity of the corn starch increased by exactly the same conditions. By prolonged boiling, as in the size box of the slasher, the viscosity of potato starch reaches the vanishing point while corn starch holds its own.

What the slasher man wants is fluidity and adhesiveness that will stay, and to get this, he needs a thin boiling starch, and viscosity cuts no ice.

There are two types of corn starch on the market, first, those known as "thick boiling starches," either "chemicaled," i. e., prepared by treatment with an alkali, or "unchemicaled," in which no alkali has been used, the starch instead being put over the runs a second time and dried more or less slowly. These unchemicaled starches are used in baking powders or as a size in the textile industries; the other type of corn starches are known as "thin boiling starches," prepared by two processes, termed the "drying-in" process and the "in suspension" process.

In the "drying" process, unchemicaled starch is suspended in water to about 22 degrees Baume, and a certain portion of hydrochloric acid added to the mills. It is then boxed and drained and the starch, containing 42 to 43 per cent of moisture, is broken up and dried. During this process, the small quantity of hydrochloric acid used converts some of the starch into the soluble form, the starch thereby producing a paste with considerably less viscosity.

In the "in suspension" process, the starch, suspended in water at 22 degrees Baume, is heated at a temperature well below the gelatinizing point with a small quantity of sulphuric or hydrochloric acid, the liquid being constantly stirred. It then boxed and dried in the usual way.

There have been other types of thin boiling starches on the market from time to time in which chlorine, daistase, glycerol, etc., have been used as transferring media, but in all cases the idea and the result has been the same, i. e., the converting of some portion of the starch into soluble starch which reduces its viscosity and increases its fluidity; and fluidity, if it can be gained without materially impairing the adhesiveness, is what we want in sizing warps so that the size will penetrate to the interior of the yarn and not be all on the outside where it can be broken up and rubbed off by the reeds and harnesses.

Starches prepared by the "thin boiling" system are capable of yielding as good results as ordinary or thick boiling starch, so far as adhesiveness is concerned, with the added advantage of superior penetration.

To quote from Dr. W. R. Catheart, "Yarn is sized for two reasons, first to impart strength to the warp, for the purpose of increasing the weaving quality, and second to add weight to the cloth. Now let us see how a thin boiling starch applies to the case. When cotton fibers are twisted into a yarn or thread there are spaces or interstices between them extending through the cross section and along the entire length. When such a yarn comes into contact with a liquid, owing to capillary attraction, the liquid is taken up and absorbed in the spaces between the fibers in the same way that a lampwick takes up oil or a blotting paper takes up ink. The amount of rapidity of this absorption depends upon several factors, such as temperature, concentration, and in the case of yarn, upon the twist; but more than anything else it depends upon the fluidity of the liquid. The higher the fluidity the more rapid is the absorption, hence the greater penetration into the interior of the yarn. When the size gets on the inside of the yarn and is then dried, the interior fibers are cemented together as well as the exterior fibers. This of course increases the strength of the yarn and lays the fiber and makes for good results in the weaving room. Increased strength due to thin boiling starch as compared with the increased strength due to thick boiling starch has been quantitatively determined beyond the peradventure of a doubt by methods as exact as it has been possible to devise, and the difference in favor of the thin boiling starch was shown to be very marked.

"When sizing for weight, the difference is again in favor of the thin boiling starch."

In the case of corn starch, the change from a usual or normal form of starch to a thin boiling starch such as is necessary to good slashing is brought about by chemical treatment, for instance:

Corn starch, when treated with chlorine at about its gelatinizing point, which is 167 degrees F., is converted into its soluble form and remains a perfectly limpid solution when hot, but solidifies when cold. This may be made as follows: 39 pounds of starch are mixed in 30 gallons of water and the temperature of the mixture raised slowly to 160 to 165 degrees F. and six quarts of clear chloride of lime solution at 15 degrees Tw. are added and the whole brought quickly to a boil; the mixture should be boiled until free of chlorine, and should not give any blue color with an iodide of potassium solution. The resulting product should be as clear as water and the starch in this form penetrates the fibers better and more thoroughly than ordinary boiled starch.

Perhaps the best and safest method for the slasher man to make his own thin boiling starch is by means of diastase as follows: Boil up the ordinary corn starch in the usual manner for thirty minutes or until completely gelatinized; then cool it off to 150 degrees F. and add with constant stirring 2½ pounds of diastafor for every 25 pounds of starch. The diastafor must first be dissolved in luke-warm water. As soon as the starch has liquified add whatever

softening is to go into the mix and boil up again *as quickly as possible.* This last is important. In most cases less diastafor than the quantity given may be used—two or three parts of diastafor to 100 parts of starch—the slasher man must experiment with this. The action of the diastafor must not be prolonged for one second beyond the point when the paste becomes thin and transparent, as, after this point is reached, the starch is gradually converted into dextrose and sugar which possess poor sizing qualities. During the action of the diastafor it is necessary to stir the mass constantly that no deposit is formed, and that the liquefaction takes place evenly throughout.

One great advantage of corn starch is its uniformity. No other product taking the place of corn starch can be standardized to the same extent. The purity of other starches varies with the weather, with the location and with the peculiarities of the soil, but starch and therefore modified starches of absolute uniformity can be produced from corn only.

Potato starch varies more in quality than any other starch largely owing to the varying amount of water contained in it. Potato starch reaches its maximum viscosity after being boiled five minutes. From this point the viscosity decreases rapidly with the increase in time of boiling, the concentration of the solution apparently having no effect on the viscosity. After boiling ten minutes potato starch has a viscosity slightly more than five times as great as corn starch, while after boiling thirty minutes the viscosity of potato starch is less than that of corn starch which has been boiled the same length of time.

It is a fact that starch goes into solution on continued boiling, and that it is converted into soluble starch. The degree to which this takes place varies with the different starches, with potato at the highest degree and corn at the lowest.

A thin boiling starch paste of great adhesiveness can be made out of potato starch without using chemicals by simply boiling it long enough, but it is not reliable. In the first place, the starch itself, as put on the market, being made at numberless little country factories, is not uniform and secondly a size mixture from potato starch is very sensitive to the necessary boiling and handling and therefore is liable to all kinds of upsets when handled the least bit carelessly in either the mixing, cooking or using. The element of chance cuts quite an important figure when using it, the personal factor is very prominent as compared with the exactness with which corn starch, modified or otherwise, can be used. To obtain uniform results, the size mixer must have a starch which remains the same between the time when the mixture is finished and when it is applied to the warp. In other words, it must be "fool proof." Corn starch fulfills this requirement and potato starch does not. Again, potato starch is more expensive.

Potato starch gelatinizes at 149 degrees F. while it takes 167 degrees F. to gelatinize corn starch.

Sago. This starch is mainly used in pure sizing, and particularly for heavily picked goods, where the chief consideration is strength. Sago has the power of strengthening the yarn to a greater extent than any other starch used in sizing, and, unlike potato, it will stand prolonged boiling without losing strength. Advantage is taken of this in the case of heavily picked goods, where it is necessary to add a large proportion of size in order to withstand the extra friction of the reeds and harnesses in weaving. For this class of work it is customary to keep the sago size on the boil the whole of the day, taking care to make the mixing sufficiently strong, in the first place, to compensate for any dilution which may take place through the condensation of the water used in boiling.

Sago is also used for "light picked" goods in which case it is not necessary to boil for so long a period as in the case of heavily picked goods. But in any case, sago size should be boiled for at least two hours before being used on the slasher frame.

Sago is used for sizing the colored yarns in warps containing colored stripes or borders. For this purpose it is pre-eminently suitable, especially in the case of narrow borders, because it will stand prolonged boiling, to which all size must, of necessity, be subjected in the separate color box on account of the slowness with which the size is picked up. The reason for this slowness is of course the small number of warp ends which pass through the size in this separate box.

If potato size were employed in this colored box it would lose all its strength long before it was used up, and the yarn would be "soft" and unfit for weaving. I might say here that potato starch has a tendency to become "soft" anyhow after it has been on the loom beams for a little time. It has been found that sago can be made suitable for use with less boiling if a small quantity of caustic soda be used in the mixing. The complete gelatinization of the starch is brought about with less treatment, and the mixing is stronger and more adhesive. The following mixture has been used with success in this connection: 25 pounds sago flour, 20 gallons of water; mix well for 15 to 20 minutes in the cold, then boil until gelatinized, stirring constantly; then add one gallon of rosin size containing 2¾ pounds of borax, one pound of rosin and eight ounces of caustic soda at 70 degrees Tw. Boil thin before using.

Caustic soda has a tendency to produce a skin on the surface of strong mixtures on cooling at the end of the day's work. This skin becomes as hard as horn during the night and cannot be dissolved by any reasonable amount of boiling the next day. The formation of this very objectionable skin may be prevented if the following proceduce be adopted: The size in the size box should be run as low as possible at the end of the day, and as soon as the steam is shut off and the slasher stopped a small piece of tallow should be placed gently on the surface of the size at each end of the box. This will form a film of grease on the surface of the size, and by preventing exposure to the air, will prevent evaporation during the night, thus avoiding the formation of a hard skin.

(This is the fourth article of a series on slashing by Mr. Nanson. The fifth and last article of this series will appear in an early issue.—Editor.)

In accordance with their custom, the Mauney-Steel Company, 237 Chestnut Street, Philadelphia, Pa., are distributing their usual calendar, which contains twelve sheets, each showing the month preceding and the month following the prevailing month on each sheet.

Thin Boiling Starches

BY GEORGE E. CHAMBERLAIN.*

One of the important steps forward in the manufacture of cotton fabrics has been the introduction of properly prepared thin boiling starches. The development of this art is of comparatively recent origin although the use of roughly made thin boiling starches extends back over a great many years.

The early corn starch makers soon discovered that in the presence of a minute quantity of mineral acid and heat, corn starch could be modified to such an extent that in many ways its qualities duplicated wheat starch.

In the old method of preparation very large irregularities existed in the finished product. That is, one lump of starch would be highly modified, and the next one very slightly if at all modified. Then again the acid with which the modification was accomplished was not removed from the starch, or in any way neutralized. As a very powerful mineral acid is used for this purpose, although the amount is small, it could readily do harm under certain conditions.

Under the modern methods in use today these difficulties have been eliminated and a thin boiling starch is now produced that is entirely satisfactory. In fact large concrete and steel buildings have been constructed and employed for no other purpose than the manufacture of modified starches. In one instance the building itself, with its equipment, cost over $250,000 and contains many improvements for this work.

In this building starch is treated in batches, each batch containing a complete carload of finished product. A weighed amount of carefully tested acid is added to the batch, while under thorough agitation. The temperature is elevated to and maintained at the proper point by very fine thermostatic control, hot water only being used as the heat medium. The batch is tested at frequent intervals by the chemist in charge. When the exact point of fluidity has arrived a carefully weighed quantity of alkali is added. This quantity is exactly sufficient to neutralize the mineral acid which had been previously used.

When the neutralization is complete the batch is diluted, sieved over very fine bolting cloth, washed through revolving filters and dried with the greatest possible speed. In this way the acid is not only neutralized but the products resulting from the neutralization are themselves removed by the washing, leaving a highly purified neutral product.

Thin boiling starches carefully produced are absolutely uniform throughout every part, each granule being exactly in the same condition as every other granule. Rapid drying leaves the starch in such a form as to be very readily dissolved in water and prevents the formation of a lumpy paste. Great care and rigid scientific control employed at each step makes it possible to exactly duplicate any required fluidity. Thus when a certain lot of starch has demonstrated that it works to the best advantage it is a perfectly simple matter to duplicate that grade of starch as many times as desired.

But over and above all else, the successful manufacture of these diversified, modified and highly refined starches depends upon the personnel of the organization which actually directs and performs the work. An organization of chemists, engineers, and mill experts is necessary and in careful manufacture there is not a single moment during the twenty-four hours when these special starches are not under the critical eye of a technical chemist especially trained for this work.

Each batch of thin boiling starch is treated as a separate chemical problem. The specifications for the starch are prepared in advance and by a rigid system of control and an inflexible inspection it is possible to pack just what is best adapted for the use of any particular mill or fabric.

In addition, starch experts are continually visiting the various mills they serve, learning the especial needs of each mill for the sole purpose of being able to specify and manufacture such a starch as will give the result desired. It is not the endeavor of these men to teach the textile experts, this is not their purpose, but they do make a minute study of the requirements of the business as regards the application of sizing material, and thus are able to successfully produce a starch that will do better work.

In these recent times of bitter competition, reduced prices and financial hardships, it is only by the exercise of the most efficient methods of production, in cost of manufacture, and quality and weight of product that a concern can be successful.

There are numerous advantages which accompany the use of these special starches, certain of which are easily measurable in terms of dollars and cents. In order to discuss these advantages more intelligently let us follow the method of application.

The starch is cooked to a paste according to various formulas, depending on the material to be woven and on the condition prevailing in the mill. This starch is allowed to fill the slasher box to a certain point. The yarn for the warp is passed through the slasher box in such a way as to give the starch ample opportunity to coat and penetrate it. The yarns are separated on emergence from the slasher box and dried. From this point the yarn goes to the looms.

Any one who has ever watched a loom in operation has often noticed the accumulation on the floor underneath the loom of small pieces of cotton fiber or lint. These bits of fiber are caused by constant attrition on the warp. When the fibers, which constitute a strand of yarn, do not adhere closely together, the loose or unattached ends are readily broken off in the loom. When common pearl starch is used in the slashing box because of its failure to penetrate and thoroughly saturate the yarn it allows these loose fibers to protrude. By the use of thin boiling starch the fibers are cemented more closely together and tests by actual weight have demonstrated an average decrease of 50 per cent in shedding.

Because a thin boiling starch penetrates through the fiber uniformly and thoroughly and thus binds each component fiber of the yarn into one compact body, the strength of the yarn is very materially increased. Tests by disinterested parties has shown this increase in strength to be from 12 to 15 per cent.

(*Continued on page* 161.)

*General Superintendent, A. E. Staley Manufacturing Co., Decatur, Ill.

A Modern Textile Lighting System

The Enterprise Manufacturing Company, Augusta, Ga., contains 35,200 spindles and 1,008 looms. The product of the mill is sheetings and drills. The mill buildings consist of a three-story structure main mill and an adjoining weave room. A lighting system was recently installed at this plant which is of general interest in that it is an example of standardized textile mill lighting.

In designing the lighting system for this plant, an endeavor was made to fill as nearly as possible the following requirements: Sufficient volume of light; uniform distribution of light; absence of glare; avoidance of obstructive shadows; a standard size of lighting unit; the largest possible unit; maximum height of unit; adaptation of any one of several types of reflectors; low upkeep cost; and cheerful appearance.

A careful balancing of the foregoing considerations indicated the desirability of using 200-watt bowl enameled lamps with R.L.M. reflectors. These units, which are used through the mill, except in the toilet and stair towers where 75-watt units are used, fill very satisfactorily the requirements outlined. They are located according to a plan which combines general and individual lighting.

In the main mill the ceiling heights are 13 feet 2 inches for the first and second floors and the third floor is 14 feet 5 inches. The lamps are mounted twelve feet above the floor. In the weave room the ceiling height is 18 feet and units are mounted 14 feet above the floor. The spacing of the units throughout the mill is on about 16½-feet centers. The mounting height for this type of lighting varies with the ceiling heights, but the spacing of lights on centers varies slightly with the size of bays and divisions in the mill.

The reflectors are of the solid neck, white enameled steel type, and flexibly suspended from the ceiling hook by a short section of conduit fitted with a hickey and condulet outlet. Weather-proof reinforced extension cord with a smooth finish is used to connect between the lamp sockets and the rosettes on the ceiling. The ends of the conductors are formed into links and then tinned so as to provide additional mechanical strength and freedom from loose strands with consequent short circuits. The top floor ceiling slopes from the center to the outside walls, and the conduit supporting the lighting units is cut to the proper lengths so as to make all these units in the same plane and at the proper height above the floor.

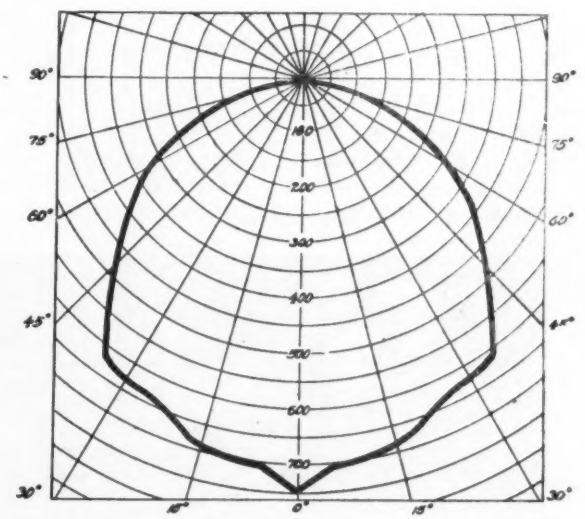
The wiring system is 110-220 volt, 3-wire, with a neutral the same size as the outside wires. Safety switches are provided in each room for the control of the lights. In general, each department is controlled separately and with three or more subdivisions.

The intensity of this lighting varies from about 5½ to 8 foot-candles. The average lighting intensity on a working plane 3½ feet above the floor, along the front rolls of spinning frames and on the weaving surface on the looms, is about 7 foot-candles, which is ample light for grey goods.

The chart shows the distribution curve of a 200-watt bowl enameled lamp and a standard R.L.M. reflector. The actual foot candles from tests are an average of 6.75, a minimum of 5.44, and a maximum of 8.02. These tests were made after the units had been installed for approximately a month without cleaning, and therefore, due to the presence of a normal accumulation of dust and lint, show slightly lower values than the theoretical distribution curve would indicate. From the present-day viewpoint this is a sufficient amount of light for a white goods mill. It should be noted that reflection from white goods and white ceilings aids somewhat in giving this high value. Of course, for dark goods the lighting intensities would have to be increased.

Test readings show that the lighting is sufficiently uniform to provide no contrasts which can be noted by the eye.

Very little glare is noticeable. The re-flected light on the white ceilings breaks up any strong contrast between

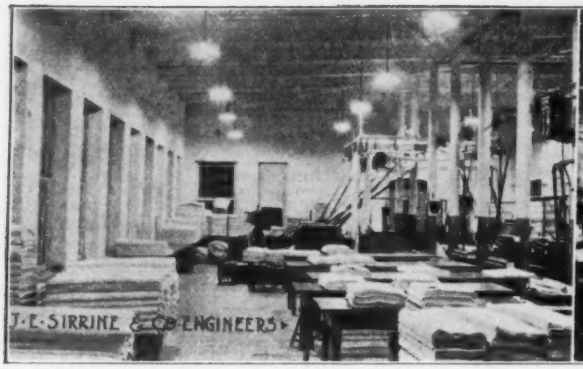


DISTRIBUTION CURVE OF A 200-WATT BOWL ENAMELED MAZDA C LAMP AND A STANDARD R. L. M. REFLECTOR.

the brightness of the lighting unit and a possible dark background. The bowl enameled lamps can be viewed directly without blinding and the high mounting removes the lighting sources from the direct line of vision. This high mounting also lessens the possibility of theft and makes much less obstruction in the room than would be caused by units hung lower. As the rooms are large and surfaces fairly white, the absorption loss is relatively low.

These 200-watt units are the largest that can be used with direct lighting to give uniform distribution of the intensities desired, with ceiling heights of approximately 15 feet. The larger number of smaller units required for the same values of illumination would be more expensive to install and operate and would cause more obstruction in the room without materially bettering the uniformity of distribution. Larger units, if installed on the same centers, would give greater intensities than present-day requirements demand. Larger units installed on greater centers would give bright areas immediately beneath them, with dark areas between.

The broad distribution curves of these units provide



A NIGHT PHOTO OF THE WELL LIGHTED CLOTH ROOM.

A NIGHT VIEW OF THE WEAVE ROOM.

a good illumination of vertical surfaces, and the entire effect is very pleasing and cheerful. The unit is easily cleaned; its high mounting removes it from step-ladder breakage or other accidents, and in these qualities the system makes for low up-keep.

The distribution of light was planned so as to be practically of the same value all over the mill, irrespective of the department or state of the manufactured product.

The average watts per square foot are .765 in the machinery spaces only. The wiring was changed over from an old 2-wire, 110-volt system that had been in use for a number of years.

On account of the height of the lighting units above the floor, it would be difficult to connect extension cord outfits for portable drills or other devices. To provide for these devices, receptacles are placed on columns at a height of approximately six feet above the floor. These are so distributed that a 50-foot extension cord will reach any point in the mill. A number of extension cords with handles and guards are provided for portable lamps. These can be used for special work on the inside of machine casings, or other places where general lighting is not sufficient.

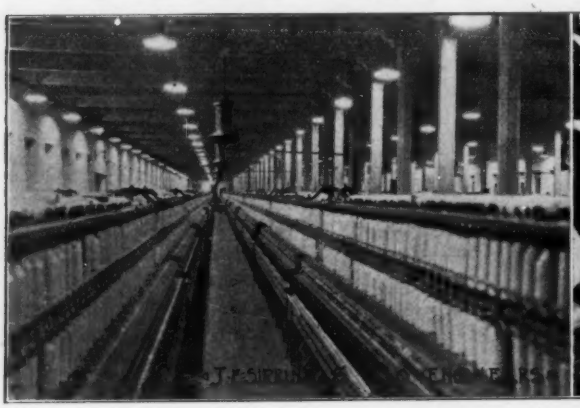
A pilot lighting system consisting of units in the passageways, stairways and main rooms is provided throughout the entire plant.

The following extracts are from the instructions which were furnished for the maintenance of this lighting system:

"Keep lamps and reflectors clean. Accumulations of dirt and lint decrease the candle power considerable, in some cases as much as 50 per cent."

"Keep lamps at proper voltage. A decrease of 10 per cent in voltage will cause a decrease in candle power of 40 per cent. A 110-volt, 75-watt lamp at 99 volts will give only 68 per cent candle power and could profitably be replaced with 50-watt lamps. On the other hand, an increase of 10 per cent in voltage decreases the life of a lamp 75 per cent."

The elements of this lighting system are intended to be standard and readily adapted to any width of bays or divisions from the old 8-foot bay to the modern 22-foot bay used in concrete construction.



A WORK ALLEY IN THE SPINNING ROOM. THE INTENSITY OF LIGHT AT THE FRONT ROLL IS ABOUT SEVEN FOOT CANDLES.

THE PICKER ROOM AT NIGHT.

The wiring for the older 110-volt, 2-wire lighting installations is not large enough for modern requirements even with these more efficient lamps. The watts per square foot on these older systems were in some cases as low as .3 and in no cases higher than .6. As the old wire sizes were computed for these values, they are not large enough to take care of a modern installation, which requires approximately .77. Frequently, however, when it is possible to use the 3-wire, 110-220-volt system, new wire can be substituted throughout and the scrap value of the large old wire removed will largely offset the cost of the smaller new wire installed.

The world stands aside to let anyone pass who knows where he is going.—*David Starr Jordan.*

What the Southern Mills are Doing

An interesting survey of textile conditions in North Carolina during the year 1921 was prepared by Hunter Marshall, Jr., secretary and treasurer of the Cotton Manufacturers' Association of North Carolina, preliminary to the meeting of that Association on December 2 and 3. Declaring that the year had been one of uncertainties and varied conditions, and outlining the difficulties of cotton manufacturing plants, which were among the first to suffer as a result of the "slump" period, Mr. Marshall dealt specifically with the matters of wage adjustments, welfare work, the attitude of employee toward employer in that state and other questions of interest. He declared that cotton mill operatives generally have understood that wage reductions were necessary, and were willing to accept their portion in the process of repairing the rupture in the commercial balloon brought about by the "period of depression."

Touching upon the Charlotte-Concord-Kannapolis strike which began in June of 1921, the report states that "after a period of approximately ten weeks, during which there was considerable suffering and misery, the operatives returned to work after having lost approximately $2,000,000 in wages and with nothing gained. This incident put the workers to thinking and it is not likely that hereafter outsiders will figure very largely between the workers in the industry and their employers, whose interests after all are identical." Mr. Marshall also pointed out that with these few exceptions, the year was marked by a cordial relationship between manufacturers and operatives. He declared that the wage reductions in North Carolina have ranged from 30 to 50 per cent, the average probably being 37 or 38 per cent, but that wages at present paid will average more than 100 per cent higher than the wages paid for the same class of work in 1914. This, coupled with the fact that the cost of living to cotton mill workers is 50 per cent less than it was at the peak of prices and is close to what it was in 1914, enables the cotton mill worker to maintain a much higher standard of living and to enjoy more of the comforts and luxuries of life or to save more money than was possible with pre-war conditions.

Mr. Marshall's concluding remarks, in regard to the prospects for the future in North Carolina textile manufacturing, are very interesting, being not only pertinent and applicable to the mills in that state, but to the entire industry as well.

"The future development of the industry in this section depends not only upon the enterprise, resourcefulness and success of cotton mill owners and investors, but to an equally large degree upon the spirit, the efforts, the loyalty and the efficiency of the operatives in our mills.

"If the industry continues to develop, as all signs indicate it will, this devolopment will redound to the benefit of workers and owners alike. It will mean greater opportunities for both. It will mean greater opportunities for merchants and other business men who are dependent more or less upon mill communities for a large part of their business. It will mean greater prosperity for our people in general because it will add to the general wealth of the state through investments, through larger payrolls and an increased purchasing power.

"The future development of the industry in North Carolina (he might well have included the entire South) depends upon the combined efforts and enterprise and the combined desire of operators and operatives. It also depends to a very considerable extent upon the attitude of the people generally toward the industry."

The regular mid-winter meeting of the Cotton Manufacturers' Association of North Carolina was held at the Carolina Hotel, Pinehurst, N. C., on the 2nd and 3rd of December with a large attendance. The two days were devoted mainly to social and entertainment features, golf taking up the major portion of the visit. On Friday night a banquet was held, and on Saturday a business session was conducted, during which the routine business of the association was transacted. The feature address was made by Col. H. F. Fries, of Winston-Salem, who advocated an increased acreage of cotton to make up for the losses caused by the boll weevil and other influences. He pointed out the danger to the manufacturing industry if the supply of raw materials is allowed to become too short. Resolutions were adopted by the association pledging their aid to the government in its efforts to eradicate the evils of the boll weevil. Another speaker at the convention was "Sunshine" Hawks, who addressed the members at the banquet.

A meeting was held during the past month at Spartanburg, S. C., by representatives of 14 companies having contracts with the South Carolina Light, Power and Railways Company, who was represented by the receiver, for the purpose of considering action to be taken in connection with the proposed adjustment of the company's affairs.

The bond holders have consented to accept five-year script as their back interest, thus avoiding foreclosure and furnishing the company with funds with which to make needed improvements that will enable more economical operations. The offer is conditioned on the general creditors accepting script for their claims, the power users agreeing to modify their contracts—continuing present rates for three years and thereafter arbitrating rates every three years—and the city of Spartanburg to agree to establish fair rates and relieve the company of unnecessary burdens.

The Industrial Cotton Mills Company has been organized to take over and operate the Blue Buckle Cotton Mills, at Rock Hill, S. C. Alex Long and I. B. Cauthen, both of Rock Hill, are president and treasurer respectively of the new corporation.

The managements of the Sibley Manufacturing Company, the Enterprise Manufacturing Company and the Augusta Factory, of Augusta, Ga., and the Graniteville Manufacturing Company, with plants at Graniteville and Warrenville, S. C., announce the contemplation of a plan for the consolidation of these companies, to be passed upon and approved by their respective stockholders. No definite decisions have as yet been announced.

It is announced that the Modena Cotton Mills, of Gastonia, N. C., in which the newly organized Spencer Mountain Mills recently acquired a controlling interest, will be operated as a separate corporation from the new company. W. T. Love will be treasurer of the Modena Mills and J. C. Rankin president, but no other changes will be made, it is stated.

A decided success from every standpoint, the second annual community fair was held at the Pomona Mills, Greensboro, N. C., recently. Creditable exhibits, an interesting program of entertainment and a large attendance, made the affair a most enjoyable one. A large number of prizes were awarded for various entries of cooking and needlework, canned goods, flowers, livestock, poultry, etc. A Boy Scout demonstration was held in the afternoon, which was followed by a band concert, and then a short program was carried out by the various fraternal organizations. A baby contest was held at this fair, and was perhaps one of the most interesting features of the occasion, twenty-nine babies being adjudged by Mrs. Dorothy Hayden, county health nurse. The fair closed with a big minstrel show in the evening.

It is reported that a cotton mill will be constructed at Pittsboro, N. C., just as soon as electric current service is available to that place. It is stated that contract for the current has been made with the Moncure (N. C.) Manufacturing Company, to become effective about March. The Chamber of Commerce is sponsoring the proposition.

In cooperation with the West Texas Chamber of Commerce, representative citizens of Post, Texas, including the mayor, Oliver C. Weakley and Herbert Jones, T. R. Greenfield, and J. F. Hartford, are developing plans for the establishment of another cotton mill at Post. The estimated cost of the project is over $1,000,000. The headquarters of the Chamber of Commerce are at Ballinger, Texas.

The Fulton Bag & Cotton Mills, Atlanta, Ga., have plans under way for the construction of a new power plant for general mill service. J. E. Sirrine & Company, Greenville, S. C., are the engineers.

The Bibb Manufacturing Company is completing the installation of 120 new spinning frames at the Osprey Mill, Porterdale, Ga. The new machinery gives the company's two plants at Porterdale a total equipment of 72,000 spindles and 150 tire fabric looms, besides braiders, and rope and twine machines.

The Superior Yarn Mills, Inc., Monroe, N. C. are installing additional yarn finishing machinery.

Several new spinning frames are being installed at the Long Island Cotton Mills, Long Island, N. C., to replace existing equipment. The company is operating 6,000 spindles on cotton yarn.

The Kerr Bleaching and Finishing Works, Concord, N. C., are building a new boiler and installing a new and up-to-date heating plant.

The Saxe-Gotha Mills, Lexington, S. C., have been merged with the Lexington Manufacturing Company and will hereafter be known as the Red Bank Mill, Lexington Manufacturing Company, according to an announcement from Allen Jones, purchasing agent. No changes will be made in the interests or managements of either plant, or in any other way except in name, there merely being one corporation where formerly there were two.

The Forsyth (Ga.) Cotton Mill is erecting a boiler and engine room, and when this is complettd the plant will be operated by steam instead of electricity, the mill owners having decided that they can thus lessen the cost of operation and also have a certain source of power. Three boilers and a 350-hp. Hamilton compound condensing engine will be installed. It is also reported that, upon the completion of this addition, an addition will be constructed for a large increase in spindles.

The Locke Cotton Mills Co., Concord, N. C., will erect a new pump house near their Buffalo plant which will supply water for both plants of this organization in Concord.

Report has it that the Cannon Manufacturing Co., Kannapolis, N. C., will erect a number of brick stores at that place.

The Lydia Cotton Mills, Clinton, S. C., are building seven up-to-date mill houses and very recently ordered a number of new Draper looms to replace quite a number of old looms that will be junked.

The Muscogee Manufacturing Company, Columbus, Ga., has made plans for the erection of an addition to its cotton warehouse. A shed is to be built which will add a new story to part of the building, giving it an added capacity of three or four hundred bales.

The Clover Cotton Mill Co., Clover, S. C., has just completed arrangements for the erection of 12 new cottages for the use of operatives.

The Industrial Committee of the Chamber of Commerce at Dublin, Texas, is reported in communication with representatives of a large South Carolina cotton mill concern which is considering the construction of several cotton mills in Texas.

The new large duck plant being constructed by the Brandon Mills, at Greenville, S. C., will be completely equipped and ready for operation within a short time, it is announced. This plant will include an initial installation of 6,000 spindles and 50 looms which will provide employment for a hundred or more persons.

The Bibb Manufacturing Company, Macon, Ga., has begun a campaign to establish a production record among its several mills in Georgia. In some of his recent talks before Bibb employees, Vice-President James Porter has stressed the necessity for economy, and Factory Manager John Porter has told of the importance of efficiency. Reports indicate that a genuine interest is being evidenced by the employees in this anti-waste campaign, showing that they realize the need for reducing waste.

The Manetta Mills, Lando, N. C., manufacturers of blankets, are building an addition to the mills which will provide for a readjustment of the carding machinery.

The Apalache Plant of the Victor-Monaghan Mills, at Arlington, S. C., are installing a new equipment of tape driven twisters to replace the existing band driven machines.

The Lockhart (S. C.) Mills will add 75 looms to their equipment, which will necessitate running a section of the spinning at night.

Denims will be added to the line of textiles manufactured at the plant of the Hamilton Carhartt Mills at Mobile, Ala. Sheetings, drills, cottonades, stripes, huck towels, etc., are being manufactured at these mills, the most of which is being shipped to South America, according to officials of the company.

An industrial league of basketball teams from at least six cotton mills in Mecklenburg County (N. C.) is being planned by Lucius Ranson, superintendent of public welfare who is taking the preliminary steps toward the league's organization. Teams, Mr. Ranson thinks, can be secured from the mills at Davidson, Cornelius, Huntersville, Thrift,

Pineville, North Charlotte and Chadwick-Hoskins. Teams may be entered from the Elizabeth and Atherton Mills of Charlotte.

Erection of a handsome auditorium building, to be known as the Erwin auditorium, modeled to meet every conceivable community need is under way at West Durham, N. C., and progressing rapidly. The structure is to be of brick and will be modern in every detail. The principal feature of the new building is to be the auditorium which is to have a seating capacity of 1,000. This, however, is merely one feature. There is to be a large dining room on the first floor in which will be installed a cafeteria. A swimming pool—the largest indoor pool in Durham—and a handsomely equipped gymnasium will be located in the building. There will also be bowling alleys and arrangements for other indoor sports.

The Union Division of the Consolidated Textile Corporation, LaFayette, Ga., entertained all the overseers of the plant, their wives, the office force and the school teachers, as well as the Presbyterian minister and his daughter, at a three-course dinner recently, served at the Linwood Community House, by Mrs. L. M. Daly, who is in charge of all community work. J. R. Killian, superintendent, acted as toastmaster, and called upon Dr. S. P. Anderson, who, taking "The Human Hand" as his subject, made an excellent talk, and in closing urged his hearers to never let an opportunity go by when a "helping hand" can be extended to another.

Miss Mamie Veazey, principal of the school, then offered a very appropriate toast, which was followed by several recitations and piano solos, by Miss Anderson and others, after which some attractive gifts were presented to several at the dinner. The program was closed with an excellent address on "Loyalty" by W. A. Enloe, general manager, after which "America" was sung by the diners.

The Laurel Mills, Laurel, Mississippi, have recently completed the installation of 500 new Model E Draper looms. W. Y. Harrison, who until a few months ago was superintendent of the Covington (Ga.) Mills for eight years, has taken the position of general superintendent at the Laurel Mills.

The New England Mill Situation.

The seriousness of the New England cotton manufacturing situation is now beginning to be more widely appreciated in consequence of the increasing competition for business and the narrowing of profit margins all along the line. Mills have been greatly hampered by excessive taxation and many of them are still resisting valuations placed on quick assets by federal authorities two or three years ago.

Some of the municipal taxes imposed this year in cities like Fall River amounted to seven per cent of the mill capital, an increase of more than three fold above normal times, and so great that the business cannot stand it unless very radical reductions in costs are made in other directions. Appeals against these excessive assessments have been made but it may take years to finally adjust to a satisfactory basis of valuation. In the limited number of villages where mills still own and maintain homes for their operatives, some of the municipal taxes are in excess of the total rentals.

Wage conditions are burdensome and manufacturers have been slow to press for further reductions, especially in the larger centers where war time harmony and cooperation were much appreciated. The resistance of many of the organized unions of New England to the sweep of bolshevism and sovietism made a deep impression on manufacturers of long experience and they have been loath to lead in reductions in advance of lower living costs.

Under pre-war conditions New England was a center of relatively low living costs. But freights have been so high in recent years that neither operatives nor mill owners have been able to profit from the very low prices farmers of the west and south have received for their products. The process of readjustment of living costs to lower levels is still in a slow stage of progression.

An illustration of the unbalanced situation was given by a manufacturer who has resisted further wage reductions in cotton mills at this time. He said in his vicinity, operatives were forced to pay from $14 to $15 a ton for coal that used to be delivered to them at half those figures. It now takes a week's wages of many operatives to buy a ton of coal for homes that must be heated regularly in a rigorous climate. Other instances of abnormal costs of the necessities of life are cited in the sustained high prices for eggs, milk, and other things dependent in large part on the cost of farm products for feeding purposes, not grown freely enough in this section, but brought in from the South and West.

There is also a problem within the textile trade itself that seems unjust to the mill worker. The thousands of workers in cities like Chicago, New York, Cleveland, Rochester, and elsewhere, who make ready to wear garments, are members of unions that dominate production to the extent of making prices for the finished garments out of all reasonable ratio to the cost of the cloth sold by the mills. Until something has been accomplished toward making finished garments lower in price, through the acceptance of lower wages by garment workers, cotton cloth manufacturers in this section do not think it is fair to ask weavers and spinners to work for still lower wages.

There are many garment workers who are being paid from $45 to $85 a week, whose places can be filled by other workers trained in less than a year. Comparison of wages on these levels with the meager wages of $18 to $25 a week paid to trained weavers, and other fabric mill workers, who spend years to become competent, tend to make every experienced manufacturer reluctant to make a subnormal wage scale in cotton goods mills. Time and economic pressure will bring about readjustment in this direction but in the meantime the mills of this section will continue to suffer in their costs of production.

The mills of New Bedford and Fall River are running to better than 85 per cent capacity at this time and manufacturers refused to revise wages downward on December 1. Some small mills in other sections have made further reductions, varying from 10 to 15 per cent, to bring the schedules nearer those prevailing in the South, and eventually all mills will join through necessity. For the winter months, however, it will be hard to induce many manufacturers to move in that direction.

In addition to high taxation, high wages, and high freights, that are making the problem of New England manufacturing difficult, there is the one of short hours, par-

ticularly burdensome in Massachusetts, that is troublesome principally because other sections run mills up to 60 hours weekly, as against 48 hours, permissible here. Such a thing as legislation that will lengthen the working time is out of the question and the handicap must go on for a long time.

In contrast with mills in England and elsewhere, there was comparatively little overspeculation in mill shares and over-capitalization, during the inflationary period. To that extent, New England is reasonably free from the burden of trying to pay mill dividends on an expanded capital. But the pressure of the past year has been hard and there has been a constant dwindling in reserves. The process cannot go much further before action of some sort must be taken.

The competition for business was forced by the New England mills early in the year to enable them to restore production and thus bring about manufacturing economies that are possible only when a full mill output exists. Close selling is still the rule and many of the larger mills are still maintaining a capacity production at a low margin of profit. This is particularly noticeable in the case of the large units like the American Printing Co., the Amoskeag Company, the Pacific mills and others. That this policy is going to be followed is already apparent.

Very recently, prices were named on Fall dress ginghams made by the Boston, Lancaster, Parkhill, and other mills making the finer products. The new prices showed an average of only 1 cent a yard advance, compared with the rise in cotton in the same period from July onward, of approximately 5 cents a pound. The cotton rise has been pretty well absorbed by the acceptance of a narrowing profit margin. Similar action was taken on Esmond blankets and fancy napped cottons offered for Fall. The advances were not in keeping with the rise in cotton since former prices were made. Buyers have placed forward orders satisfactorily on these special lines.

When prices were made recently on percale and prints for future deliveries, the advances were not in keeping with the rise in gray cloths. Buyers ordered moderately and the large printers have business enough in hand to keep them employed for this month and next. On the other hand, the job finishing plants are less well employed. A recent tabulation of production in the job finishing plants of the country showed as follows: White goods, reduced from 85 per cent in October to 76 in November; dyed goods, from 91 to 84; fast blacks, 65 to 60; and prints, 73 to 62. It is now believed in the trade that buyers of wash fabrics will come into the market for supplies very soon after the middle of January and there will then be a scramble for merchandise not in hand.

Bleached cottons have been very dull. Fruit of the Loom 4-4 goods were reduced from 20 cents a yard to 17½ cents but other brands did not follow the reduction. One or two allowed rebates on undelivered orders to harmonize with the lower prices. Unbranded goods remained dull. Wide sheetings, sheets, and pillow cases are still sold ahead but some of the pillow tubing mills can now take on more business. Competition for the bleached trade is certain to be very much sharper during the coming year and some new brands are alreay making headway and a great deal is being done to push them by special advertising.

The gingham outlook is considered as good as at any time this year, distributors having cleaned up their stocks well and consumers having shown a distinct preference for this class of merchandise. The new styles show a departure from the narrow checks to a slightly larger pattern effect in varied colors. Buyers have shown a noteworthy preference for dobby effects on ginghams and for patterns with varied colorings not of a striking character.

Tickings have been held at value for some little time past and will be priced eventually on a basis under 28 cents for 8 oz., and there will also soon be a revision of prices on denims. There has been an improvement in the call for the higher qualities of working suit materials such as cotton trouserings, cotton cassimeres, etc.

On fine and fancy cotton goods the trade has been moderate but full enough to keep most of the mills comfortably employed. Many specialties have been put in work and during the coming year it is probable that more fancies in fine cottons will be seen than American mills have produced since before the war. The printed wash fabrics in fine yarn cloths have not sold well for advance delivery but a large business has been done on yarn dyed effects, such as tissues, swisses, and some of the other sheer materials.

The chief improvements that are being made in mills is in the northern section. The Amoskeag and Pepperell companies are continuing their work on applying their large water powers electrically. The Pepperell is also adding many wide looms to replace narrow looms used for years on heavy specialties no longer required in quantities by the jobbing trade. The machine shops have been revising wages steadily and are slowly working to a position where they will be able, early this year, to make lower and more attractive prices for renewal work.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, Dec. 16th, 1921.

Much to the surprise of the trade, the government's final cotton crop estimate, issued on 12th inst., was larger than any of the private forecasts, promising a yield of 8,340,000 bales exclusive of linters.

The larger yield than generally expected, the government attributed to the larger acreage than estimated last July by about 6,000,000 acres, and the exceptionally favorable weather during the fall, Washington's small acreage estimate last summer having been influenced by persistent and wide-spread propaganda for reduction in acreage of 35 to 50 per cent at planting time.

The acreage picked is estimated at 31,427,000 acres, abandoned 2.8 per cent. Therefore, it is evident that the acreage planted to cotton this year is now estimated by the government as having been 32,332,000 acres compared with its preliminary estimate in July for an acreage of only 26,519,000 acres.

However, the larger acreage by nearly 6,000,000 acres than figured on earlier in the season, and the fact that the final estimate is for a production of only 8,340,000 bales. notwithstanding the more favorable weather during the late growing and maturing periods, shows how great the damage by the weevil was, and makes the outlook for next

year's crop very unpromising for the large crop which the trade will undoubtedly need, as indications are that the carry-over at the end of next July will be very small.

Meanwhile the somewhat larger yield than generally looked for will not alter the prospective strong statistical position very much owing to the large takings by foreign and domestic spinners. During November American mills consumed 580,000 bales including linters vs. only 368,000 for the corresponding month last year, making the total since August 1st 2,195,000 against 1,856,000, indicating a domestic consumption for this season of 6,500,000 to 7,000,000 bales compared with 5,402,000 last season and 6,841,000 season before last.

During the past week, compared with last season, spinners of the world took of American cotton 360,000 bales vs. 271,000; since August 1st 5,988,000 against 3,943,000, or 2,045,000 more than one year ago, with prospects of continuing to take more than last year during the remainder of the season, making it likely for the world to take 13,000,000 of American this season vs. only 10,500,000 last season.

That consumption and takings will continue large is indicated by the fact that 34,387,000 spindles were in operation at the close of November in the United States compared with only 31,700,000 operating at close of November last year, also because of the large takings by Germany and Japan, the former promising to take about 1,500,000 bales this season vs. about 1,250,000 last season; Japan about 1,000,000 against 735,000.

England is the only country remaining inactive in importing the American product in quantity, but as conditions in India are improving and settlement of the Irish question near at hand, Manchester is becoming more cheerful and will likely buy more freely in the future.

On December 1st the South had only about 7,607,000 bales still to market against 11,217,000 on corresponding date last year, or about 3,610.000 less than one year ago, as the following comparatives disclose:

	This season.	Last season.
Carried over in the interior, Aug. 1st.	4,690,000	2,408,000
Crop, estimated	8,340,000	13,440,000
Total supply	13,030,000	15,848,000
Marketed to Dec. 1st.	5,423,000	4,631,000
Remaining to be marketed Dec. 1.	7.607,000	11,217,000

Today the world's visible supply of all kinds is 5,860,000 vs. 6,022,000, of which 4,247,000 is American against 4,373,000.

The statistical position of other kinds, as well as American, promises to become very strong eventually, probably resulting in much higher prices ultimately. The world will require a large crop for next season, perhaps a very large yield, and as this year's yield per acre was the smallest ever known, only 126.9 pounds against 178.4 last year, due mainly to damage by the weevil, it is doubtful if a moderate, much less a large crop, will be raised in 1922.

Southern Spindle and Flyer Company, Inc., Charlotte, N. C., are sending out an attractive art calendar for 1922.

The value of counting machines in the operation of a textile plant is rapidly being recognized by all departments in the mill, according to J. C. Wallace, superintendent of the Durant Manufacturing Co., Milwaukee, Wis., after a tour of a number of textile mills and a visit to the Textile Exposition in Boston. Everyone connected with the production of the mill, from the mill owner down to the operative, is realizing the importance of a means of recording the actual production of the various machines as it affects his particular welfare.

The manufacturer sees the counter as a profitable investment because it has proven itself to be a cost-cutter. The superintendent sees its need as a stimulant to production. The foreman recognizes it as a real help to supervision as it shows up the production of each machine at a glance. The planning and cost departments use the counter as a positive and correct record of production obtained at a minimum cost. The time department finds its work simplified with less "come backs" after pay day. While the employee knows it as an aid to his earning capacity, giving him a record of his work at all times so that at the end of every day he knows just what he has earned.

It appears that the method of paying by picks woven is becoming more and more popular throughout the textile industry. This gives the operator his pay measured exactly by the amount of work he has done, and there is no chance for a discrepancy as to the amount he is entitled to receive because of stretching or shrinking. There is no chance for dispute—the figures are there at all times and at the end of an hour or a day the records are immediately obtainable and this is but one of many useful applications in textile work.

The advantages of a wood tank are explained in an interesting booklet issued by the Hauser-Standar Tank Co., of Cincinnati, Ohio, manufacturers of wooden tanks for every purpose. Wood tanks are not corrodable, the booklet points out, and therefore are not affected in localities where the water abounds in chemicals which would induce corrosion in steel tanks. Also, the booklet explains, a wood tank is a very effective frost proofing in cold weather, and also protects from heat as well, and where used for drinking purposes, water stored in wooden tanks is much cooler in the summer than when stored in steel equipment. The upkeep and maintenance of wooden tanks is also a comparatively small expense, continues the bulletin, which presents further evidence in this connection as to the economy of wooden storage facilities.

The booklet also shows the construction of wooden tanks used for numerous and various purposes. The company has been manufacturing wooden tanks for over half a century, and manufacture tanks for all purposes and of any size and specifications, in addition to the standard sizes and types. They also manufacture pressure tanks, single tanks with agitators, lead and rubber lined tanks for acid storage, and other types adaptable to textile uses. Another feature of the bulletin is a study of the action of various chemicals upon different woods used for chemical tanks. The booklet contains some important information in connection with wooden tanks, and should be of interest to anyone interested in this type of storage. It will be sent free upon request.

Twist in Cotton Yarns

BY ARTHUR L. BURTON.

The primary object in slubbers, intermediates, seconds and jacks is to so draw out, or attenuate, the sliver from the drawing frame as to be in suitable condition, size, diameter, length and compactness to be used on the spinning frame or mule, and there further attenuated and twisted for use in following processes.

Drawing rolls, as at present constructed, cannot perfectly draw out bodies of fibers which are uneven and varying in length and diameter. Cotton is not grown that does not vary in length of fiber. During the drawing processes the relative sequence of those fibers is altered in proportion to the extent of the draft attempted. In other words, no matter how the fibers may be laid relative to each other—say, in the slubbing operation—the fibers are disturbed and their position changed every time they pass through the drawing rolls in the subsequent processes. A slubber roving may be fairly even in diameter of cross section of the fibers, and yet, through some fault in the subsequent processes, be in a terribly uneven condition when taken to the spinning frame or mule for final attenuation and twisting.

The less variation in the length of fibers, the greater the length of draft attainable and practical. If cotton did not vary in length of fiber, fly frames would not be needed; that is, if drawing rolls were a perfect means of attenuating the fibers, which they are not. Therefore, in order to offset this unevenness of fiber and yet attain a maximum fine count of yarn from a given length of fiber, we repeatedly double and attenuate, twist, double and attenuate and twist and so on, until we have a yarn for the purpose intended.

There is no doubt that a doubling of more than two ends would be advantageous in the early processes. The difficulties attendant upon presenting more than that number are no doubt such as have prevented its adoption.

The twisting of the fibers at the various stages onward from the drawing frames to the final stage on the fine jack is to so support cohesion of the fibers as to prevent falling apart, and to enable bobbins to be built that will readily turn in the creels of the mule or frame as the sliver is being unwound. Twist assures cohesion, therefore, and protects the bodies of fibers as they are laid on the bobbin.

The direction of twist has some influence on the spinning; that is, the direction of twist in the roving. It is undoubtedly the case that better spinning is obtained by having the roving and spinning twist in the same direction than in the opposite. It is a well known fact that in English and German mills a maximum roving twist constant is used for warp spinning (twisting the same way as in the roving) and a minimum roving twist constant used for weft spinning (twisting in the opposite direction of twist in the spinning to the roving).

Twist has a beneficial influence, when not used to excess, and when in the same direction in both roving and spinning. The reason many carders prefer as low a twist constant as possible is because it enables them to turn off a bigger production, but this is not the case with the spinner. The carder's action in this case if of no assistance to the spinner. Roving may be insufficiently twisted, even when it is not breaking in the creel. However, care should be taken to avoid twisting the sliver to excess in any degree, and causing it to withstand more strain in the attenuating processes of the last stages. Usually, if a roving turns in the creels of the mule or frame, without breaking, it is taken as an axiom that it is not being stretched. This matter of roving twist is worth all it costs to look into thoroughly. A heavy, powerful, large round glass is useful to both spinner and carder—a glass similar to a reading glass—for detecting stretching of roving sliver in the creel, or the twisting of roving sliver to excess, while the machines are in operation.

The efficacy of twist varies in different grades of cotton, and it is also influenced by the degree of uniformity of the length of fibers contained therein. The amount of twist necessary to properly bind the fibers varies with the grade of cotton used. Cottons which are long and harsh generally lie compactly with twist and require least, while those that are short, or are lacking in snap, do not lie compactly and require more twist.

The object in applying twist in yarns is to secure a common bond among the fibers, and thus create a certain degree of tensile resistance to tension. The purposes for which the ultimate yarn is intended governs the amount of twist to be inserted. Ordinary standards in use are somewhat as follows:

RING SPUN YARNS.

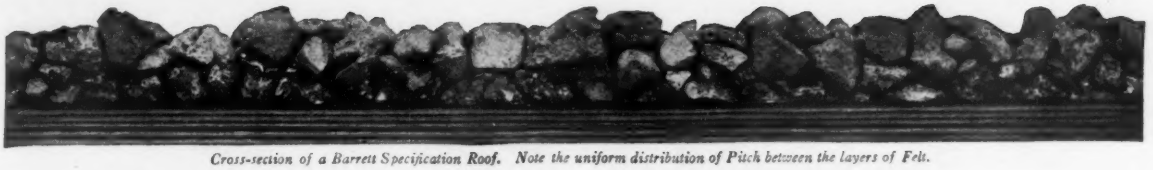
$\sqrt{\text{Count}} \times 3.25$ — Soft Weft.
$\sqrt{\text{Count}} \times 3.50$ — Medium Weft.
$\sqrt{\text{Count}} \times 3.75$ — Soft Twist.
$\sqrt{\text{Count}} \times 4.00$ — Ordinary Twist.
$\sqrt{\text{Count}} \times 4.25$ — Water Twist.
$\sqrt{\text{Count}} \times 4.50$ — Hard Twist.
$\sqrt{\text{Count}} \times 4.75$ — Extra Hard Twist.
$\sqrt{\text{Count}} \times 5.50$ to 8.50 — Crepe Twist.

MULE YARNS.

$\sqrt{\text{Count}} \times 3.18$ — Egyptian Weft.
$\sqrt{\text{Count}} \times 3.25$ — American Weft.
$\sqrt{\text{Count}} \times 3.39$ — Egyptian Medium Twist.
$\sqrt{\text{Count}} \times 3.50$ — American Medium Twist.
$\sqrt{\text{Count}} \times 3.60$ — Egyptian Twist.
$\sqrt{\text{Count}} \times 3.75$ — American Twist.

However, it must be borne in mind that the foregoing twists are not always adhered to. There are many modifications in the rules made as time and spinning conditions render expedient. The word "twist" in the preceding standards may be taken to mean "warp" inasmuch as it is customary in America to use that word, whereas the English term would be "twist." In other words, "twist" means warp, and "weft" means filling.

A knowledge of the effects of twist, apart from the effects created by using varying twist constants, is essential in spinning. The effect of twist in yarns varies with the character of the cottons used. Its influence is greater in fibers which are long and even in length, or uniform and silky in texture, and carefully prepared in the carding processes. Twist darkens the shade of the yarn,



Cross-section of a Barrett Specification Roof. Note the uniform distribution of Pitch between the layers of Felt.

Right Construction is *Half* the Roof—

STUDY the illustrations at the right. In these the successive steps in the building-up of a Barrett Specification Roof over concrete are graphically shown. The Barrett Specification describes in detail the manner in which the roof shall be laid, because *right construction is just as important as the use of right materials.*

The Barrett Specification Roof for flat- or nearly flat-roofed buildings, consists of several alternate layers of Specification Pitch and Specification Felt, with a surface covering of gravel or slag. These materials are used because 60 years' experience has proved—

—that no other bitumen has the weather-resisting properties of this high grade pitch;
—that no other kind of felt has the lasting tensile strength of this carefully selected felt;
—that no other surfacing material renders a roof so highly fire-resistant as gravel or slag which serves the further purpose of holding in place the extra-thick *poured* top coat of Barrett Specification Pitch.

Have your roofing contract call for the 20- or 10-year Surety Bond Guaranty. This is issued free of charge through the U. S. Fidelity and Guaranty Company of Baltimore. Then you will be sure that Barrett Specification materials will be applied, in sufficient quantities and by proper methods For all Barrett Specification Bonded Roofs are constructed under the watchful eye of an experienced Barrett inspector who is present on the job to see that the Specification is strictly complied with.

Before specifying or closing contract for a Barrett Specification Roof, be sure to read carefully all the stipulations in the Specification.

Full details regarding these Bonded Roofs and copies of The Barrett Specifications sent free on request.

The concrete roof-deck is heavily mopped with a uniform coating of Barrett Specification Pitch.

Left: Mopping on the Barrett Specification Pitch. Each layer of felt is hermetically sealed to the adjoining layer by the pitch waterproofing. In no spot do the layers touch each other.

Right: Laying the Barrett Specification Tarred Felt on the pitch seal coat. Four plies with pitch in between are laid over the entire roof surface, each ply overlapping three-fourths of the preceding ply.

Below: Pouring final coat of hot Barrett Specification Pitch and embedding thick wearing surface of gravel or slag after entire roof has received four plies of felt and pitch

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Barrett Specification Roofs

Bonded for 20 and 10 Years

in proportion to the increase in the size of the twist constant used. The more twist inserted, the darker the shade. The yarns are also harsher, colder to the touch, less absorbent and more difficult to finish or dye; there is also more of a tendency to curl or shrink than is the case where twist constants of low standards are used.

Some years ago, in Manchester, England, a number of special tests were made, over 12,000 in number, to ascertain the best breaking strengths in cotton yarns in terms of an increasing twist constant, and in terms of increased strength per turn of twist inserted. It was found that in the best yarns the strength per turn of twist became gradually less at $\sqrt{\text{Counts}} \times 3$. That also in the best yarns the strength ceases to increase with added twist at $\sqrt{\text{Counts}} \times 5$. That the shade and touch in the same yarns became appreciably affected after $\sqrt{\text{Counts}} \times 3.50$. That the shade of the yarn is very slightly affected up to $\sqrt{\text{Counts}} \times 3$, but that after $\sqrt{\text{Counts}} \times 5$ it is very appreciably darkened.

A singular coincidence was that the twist constant showing the greatest strength per turn of twist was $\sqrt{\text{Counts}} \times 3.18$. The twist standard adopted by the English spinners in general when spinning weft yarns from Egyptian cottons is $\sqrt{\text{Counts}} \times 3.18$.

The amount of twist to be put in any yarn is governed, as stated before, by the purposes for which the yarn is intended. Local conditions influence the matter a great deal. Many a spinner is forced to put in more twist than he really feels he ought to because of the careless way in which the roving is prepared. Or it may be because the carder is hampered by inefficient, old, or insufficient machinery to turn off a good quality and quantity of product. It has always seemed singular to the writer that we American manufacturers are so addicted to the careless handling of the cotton fiber in the first stages of opening, mixing, picking and carding. We rush the material through day after day, as though each day was the last we were to have in this world, and it were absolutely necessary to clean everything up and out of the way in time for the funeral gong at 5:30 p. m. We are addicted to hiring the poorest and cheapest help for the card room, and the poor carder is sometimes at his wits' end in getting his ever changing help on the carding end in something like a half-efficient gang of workers.

Here we make a mistake, those of us who pursue this course. We should select our card help, picker help, etc., as we select help for other mill work, there should be honest endeavor made to keep them, their wages should be fair in comparison with the other workers, and above all, strict scrutiny should be exercised in keeping the carding and picking departments efficient. There should be sufficient machinery to properly card the cotton for the purpose intended—this makes all the difference in the world to the spinning and weaving production.

Far be it from the writer to make the statement that everybody else is smarter than we are, yet I remember foreign mills in which I have worked, using American cotton, making sheetings, lappits, fancy jacquard damasks, print cloths, bed quilts, etc., etc., and to see and work in these mills was a treat in efficienry. 1 inch to 1⅛ inch middling cotton spinning 28s to 32s warp, and 36s to 46s filling, all single roving, careful—almost jealous, I might say—supervision of opening, mixing, picking and carding was exercised in order to clean and parallelize the fibers for the roving.

When we consider the fact that in a majority of these foreign mills they were using mules for both warp and filling, we begin to see what they got away with. In the first place, to spin those yarns, to get a beautiful nap on the goods, to make the work spin well, to keep all the weight possible in the yarns instead of on the floor or roller beams, they had to retain all the short, but clean, and parallel fiber possible in the yarn. As the drawing rolls on the mules had to be set so that they accommodated the longest fibers, the short fibers naturally stuck outwards from the main thread, and formed what is known as the ooze. This must be preserved, they considered. If we can only get all this ooze into the cloth we are benefited at every turn, instead of selling it for fly waste and sweepings. So they paid a little more for skilled help—mule spinners—than they would for ring frame workers, and discounted the difference in maximum counts spun, better yarn, less waste in spinning, etc.

The work ran well—single roving notwithstanding—production was high, mules of large capacity were used—a common weft mule of 1 3/16 inch gauge contained 1,560 spindles, or 130 dozen as they say. Imagine the production on these mules with highly-skilled operatives, spinning, say, 36s to 46s weft cops!

Then there were the "twist" or warp mules. These were also of large capacity, generally of 1½ to 2 inches gauge, and, say, of 100 dozen, or 88 dozen spindles, more commonly used. Naturally there was less pounds per spindle efficiency on the warp spooling with the mule cops—size of cops notwithstanding—than there is on the ring bobbin, but even though the spooling cost was higher, it was found so much cheaper to spin maximum counts, maximum strength "with minimum twist," minimum waste, single roving, etc., by the aid of mules, and that the slight increases of cost in spooling and spool capacity, and hence a higher cost of warping, were completely overbalanced by the mule advantages over ring spinning. The writer attributes this advantage which the foreign manufacturer possesses over those in America to having more highly-skilled help, less transient help, cheaper labor, etc.

The point I wish to convey in this article now becomes clear—that twist in yarn is governed by the purposes for which the yarn is intended, local conditions influencing the matter to a tremendous extent. If cotton sliver is carefully prepared in its initial stages of manufacture, it will sail through the spinning, finishing and weaving departments at a great rate.

We in America have not been so fortunate, on the whole, in keeping mill help, breaking in new help, and so on, as have the foreign manufacturers. It is a common thing, in England for instance, to find weavers who have run the same set of looms for over 20 years. It is the same with the speeder tenders; I know of authentic cases where speeder tenders have worked in the same alley for 32 years. I have personally shaken hands with mule-spinners at their own mule-ends who have run the same pair of mules for 35 to 37 years. This class of "stick-to-it" help have been more or less unknown to American manufacturers, and we consequently have been forced to assist in every way possible the help we did and do have. To compensate for the position we hold, we have had to put

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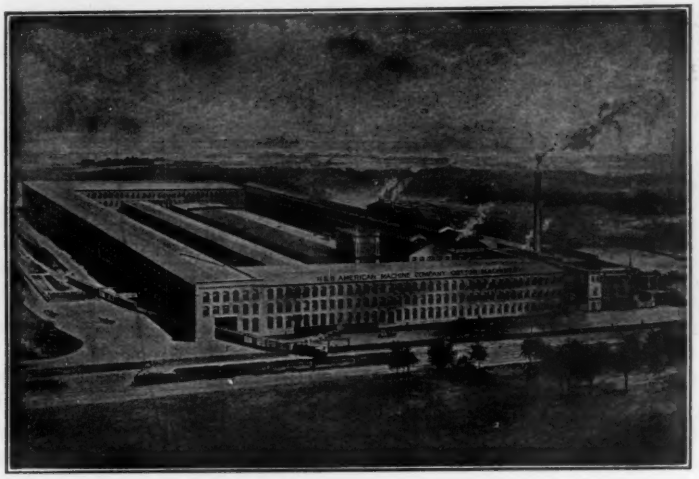
Card Room Machinery



Spinning Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

COTTON MACHINERY

in all kinds of labor-saving devices, extra section men, third hands, boss doffers, etc., etc. Anything to assist the spinner or speeder tender in her work and make her stay.

In many cases the foreign speeder tender, weaver or spinner oils her own machinery, cleans her own rollers, etc., and even goes down on her knees and with scrubbing brush, soap and hot water, cleans her own alley at Saturday noon. We might say, "We don't want that standard here," and that may be so, but, nevertheless, there is a personal pride in doing work well, and we have too much of a tendency to shirk work and "let George do it."

All this attention, or inattention, to detail, cleanliness and skillfulness reflects materially in matters of twist and the ultimate production. Of course, it is recognized that twists in yarn have to be inserted according to the purposes for which they are needed. I will take up in a later article the amount of twist necessary on twisters to properly fold and ply yarns for various purposes. The present article is written to draw attention to the importance of carefully preparing cotton sliver for its attenuation and twisting, also the important bearing that carefulness—or carelessness—has on the quality and quantity of the finished product, whether it be cotton cloth, hosiery yarns, thread yarns, electrical wiring yarns or some other kind.

The Draper Corporation, Hopedale, Massachusetts, are distributing their usual calendar, for the year 1922. This is arranged with the usual attractive back-ground of cotton plants, and showing a photograph of a Northrop loom in the foreground.

Notes About Men You Know.

O. J. BOOKER, formerly at the Massachusetts Cotton Mills, Lindale, Ga., has been made overseer of weaving at the plant of the Bibb Manufacturing Company, Porterdale, Ga. He succeeds W. C. Frazier, who recently resigned the position.

T. W. CHURCH succeeds R. D. Grier as president of the Ronda (N. C.) Cotton Mills.

F. C. BRONSON has become superintendent of the Ronda (N. C.) Cotton Mills.

J. R. HIX has been elected president of the Roaring River (N. C.) Mills, succeeding W. J. Palmer, resigned.

HARRY B. GOULD, for the past eighteen years has been New England representative of the Merrow Machine Company, of Hartford, Conn., died suddenly on Tuesday, November 29, 1921.

JOHN OLIVER has become night overseer of spinning at the Piedmont Cotton Mills, Egan, Ga.

M. L. ROGERS has resigned his position at the Wiscasset Mills, Albemarle, N. C., to become superintendent of the Dilling Cotton Mills, Kings Mountain, N. C. He succeeds Thomas King. Upon Mr. King's resignation of this position, he was presented with a handsome present by the overseers in the plant as a token of their esteem for him.

CLAUD B. ILER has accepted a position with the Keever Starch Company, and will handle the territory formerly covered by his uncle, the late Jack Iler, it is announced by James H. Maxwell, southern agent of the company.

F. D. WILLIAMS, formerly of McColl, S. C., has succeeded R. B. Hunt as superintendent of the Eatonton (Ga.) Cotton Mills.

Notes About Men You Know.

JAMES M. GREENE, for nearly twenty years on the road with the American Appraisal Company of Milwaukee, Wis., and the past seven years, district manager of the southern states, with office in New Orleans, has recently opened a branch office at 401 Healey Building, Atlanta, Ga., and will be in personal charge as district manager of the southeastern territory covering Georgia, Florida, South Carolina, Eastern Alabama, and Western North Carolina.

The American Appraisal Company specializes in establishing values of cotton mill properties for both current uses and federal tax purposes and are well known in the textile industry. Mr. Greene states that the excess profits tax problems of the industry has kept them very busy of late as the company is well equipped to handle this difficult service and, in many cases, assist the tax payer to arrive at an equitable adjustment with the Government on returns made during the high tax years.

R. M. MAULDIN, who has been southern representative for the J. Spencer Turner Company, of New York City, with headquarters in Charlotte, has resigned that position and accepted a position with the Saco-Lowell Shops, and will be connected with the Boston office of this organization. Mr. Mauldin was connected with the Greenville (S. C.) office of the Saco-Lowell Shops prior to going with the J. Spencer Turner Company about two and a half years ago. He assumed his new connection with them on January 1st.

ASHBY L. BAKER, president of the Virginia Cotton Mills, Swepsonville, N. C., and a director of the McAden Mills, McAdenville, N. C., died at his home in Raleigh, N. C., on November 30.

E. L. SORD has accepted the position of overseer of spinning, twisting and spooling at the Payne plant of the Bibb Manufacturing Company, Macon, Ga. In this position he succeeds George David Simpkins, Sr., who recently resigned to go to his home in Pelham, Ga., for a much needed rest. Mr. Sord was formerly overseer of carding and spinning at the Adams Mill, Macon, Ga.

J. T. KNIGHT has been made assistant superintendent of the Prendergast (Tenn.) Cotton Mills. He was formerly at the Lillian Mills, Bessemer City, N. C.

B. H. HUBBARD has accepted the position of spinning and winding overseer at the National Cotton Mills, Lumberton, N. C.

A. H. HAMILTON has become overseer of carding and spinning at the Ernaldson Mills, St. Pauls, N. C. He was formerly spinner at the Bladenboro (N. C.) Mills.

MILTON G. SMITH, Greenville, S. C., recently was appointed by H. W. Butterworth & Sons Co., Philadelphia, manufacturers of mercerizing, dyeing, bleaching and finishing machinery, as their southern representative.

J. P. HALLMAN has accepted the position of overseer of weaving at the Edna Cotton Mills, Reidsville, N. C. He formerly held a similar position at the Republic Cotton Mills, Great Falls, S. C.

J. P. FARR has returned to the position of overseer of spinning at the Covington (Ga.) Mills.

M. H. MCCLENDON has been appointed superintendent of Division No. 1, Loray Mills, Gastonia, N. C.

JOHN C. STROUD has accepted the position of general overseer of carding at the Loray Mills, Gastonia, N. C.

ARTHUR R. FRANCIS, who has been the New England representative of the Stevens Yarn Co., announces that he has entered the yarn business for himself, with offices at 1102 Union Trust Building, Providence, R. I. Mr. Francis is a Providence man and has a wide acquaintance among the yarn consuming trade in that section. He recently made a southern trip and advises that he proposes to secure several good mill accounts of weaving yarns and handle them on a brokerage basis. It is his intention, he states, to make a careful selection of a few good accounts of weaving yarns and specialize in giving service and satisfaction.

D. H. WHITENER, formerly of Gastonia, N. C., has become overseer of spinning at the Union Mill No. 2, Mt. Holly, N. C.

S. W. ENGRAM has been promoted to overseer of weaving at the Monroe (Ga.) Cotton Mills. He was formerly second hand.

R. F. GOODROE has been made superintendent of the Everett Mills, Monroe, N. C.

A. B. MCMANUS has been promoted to the position of overseer of the picker room at the Lancaster (S. C.) Cotton Mills.

B. L. CLARK has been made overseer of weaving at the Calhoun Mills, Calhoun Falls, S. C.

W. A. MEEKS has been appointed overseer of weaving at the Columbus (Ga.) Manufacturing Co.

T. W. Webster has been promoted to overseer of spinning at the plant of the Bibb Manufacturing Company at Porterdale, Ga., succeeding J. G. Sanders.

G. C. BRYANT has been made assistant superintendent at night at the Porterdale (Ga.) plant of the Bibb Manufacturing Company. He was formerly overseer of twisting.

W. P. HOGUE, formerly overseer of weaving at the Exposition Cotton Mills, Atlanta, Ga., has accepted a similar position at the new Peerless Cotton Mills, Thomaston, Ga.

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We have added to the range of Du Pont Dyestuffs two level-dyeing acid colors and one bright, direct dye.

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STRAIGHT LINE METHODS

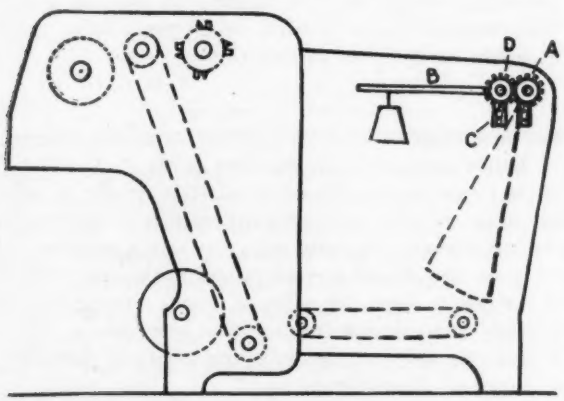
How Other Men Manage

Practical Discussions by Cotton's Readers on all varieties of Mill Subjects

A Friend to the Finisher Picker.

EDITOR COTTON:

As soon as I saw the sketch in the letter from "J. H. Y.," entitled "A Thin Lap Preventer for Breaker Pickers," in your October issue, I was impressed with the idea. Upon applying it, however, I saw that there could be a slight improvement made on it, and am sending you the accompanying sketch to show how this may be done. A gear is fastened to the shaft supporting the false back at A, and a bearing C used with a stud containing another gear meshing with the gear A. The lever B is fastened with rivets to the gear D and the weight is then applied to the lever B. By arranging the lever in this manner, you can readily see that it does not project outward from the rear of the hopper; therefore, it makes it more convenient for the man who passes behind the machine, does not require any more floor space and naturally, the lever is not liable to be bent nor the weight knocked off on the operator's toes. The gears may be of any number of teeth or pitch. The cost of installation is very little more and it works well.



I feel that "J. H. Y." has made a wonderful discovery for we have had a great deal of trouble with our breaker laps varying from three to eight pounds. I don't mean to say that the weights would vary eight pounds if the attendant would keep the hopper full all the time, but experience has shown that an attendant will fill the hopper and then walk off or sit down and leave the machine to make an even lap. This, of course, is annoying and makes it very hard for the finisher man to keep his weights correct even though the evener motions may be doing their work as satisfactorily as they were designed to do. The point is this: if even laps are supplied to the finisher, even laps would be made, provided the machine was not a piece of junk being used to make finished laps.

We have installed two of these devices, one on an Atherton breaker and another on a Whitin breaker, and the lap weights do not vary over two pounds—with the hopper full and with the hopper one-fourth full—and the number of laps set back to be run over has decreased from about twenty or thirty to practically none. In fact, this little appliance might well be termed "The Finisher's Friend," and its worth cannot be fully described.

Through the pages of your discussion department, I want to thank "J. H. Y." for the idea. C. N. S. (N. C.)

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Answers to "B. C. A.'s" Spinning Questions.

EDITOR COTTON:

I take pleasure in an endeavor to assist "B. C. A. (N. J.)" with his roller trouble. First of all, before entering into the explanation and discussion of this matter, I want to say that the real cause of "B. C. A.'s" worries, human nature, is a most peculiar affair. Every man seems to be more or less selfish—some more so than others—and will oftentimes go to the extreme regardless of the other fellow; sometimes these things are done, perhaps, unconscious of their effect on the other person, but they are done mostly for the man's own protection.

This question that "B. C. A." has asked can in some cases be answered by the buyer, for the grade of cotton that has been purchased may be 1⅛ or 1 1/16 inch, as the case may be, and yet its strength may be far inferior to another cotton of the same length. If this is the case, the real trouble can be placed at the feet of the cotton buyer, and in such a case, in order that the speeders may be made to run decently, twist must be applied in order to obtain any kind of a production at all. This in many cases is the reason that makes spinners ask, "Why do I have to open my rolls to such widths?"

Then, again, we find carders who, not understanding the correct methods of drawing card sliver on their drawing frames, spoil the work at that process to the extent that compels them to put twist into their roving which could have been left out had the drawing process been adjusted properly. If drawing frames are correctly adjusted there are very few chances of one's having to apply twist to hold the roving together. If the cotton happens

to be 1⅛ inch, the rolls should be set as follows: Front and second rolls, 1¼ inch; second and third rolls should be opened far enough so that when a rule is pressed down on the top of the sliver between the rolls it will give way easily; this also should be applied to the third and fourth rolls.

This produces a sliver drawn properly. Then the actual surface speed of the calender roll should be figured, also the surface speed of the front steel roll and these two speeds compared. If the calender roll surface speed exceeds that of the front steel roll the tension should be adjusted so that the calender roll is .50 of inch in 100 revolutions slower than the calender surface speed, thus allowing what I call "a perfect give and take."

Then it will be found that the trumpet may be of the wrong size bore. If the sliver runs very slack, upon removing the trumpet a very small hole will be found that should be reamed with a square reamer to allow the sliver to pass through a tapered hole. This hole should be reamed large enough—but not too large—to remove all friction upon the sliver, leaving only enough at the very lower extremity of the hole to keep the trumpet balance in working order.

The reaming of a trumpet is a very important operation. If a person would experiment upon an old trumpet with a square reamer the results would be astonishing. While working out the exact speeds (surface), tensions and shape of bore in trumpets upon a three process drawing system, I found that by taking three old trumpets and shaping the taper hole so that I had a very wide inlet and a 3/16-inch outlet, I kept the balance correctly and had to remove nine teeth of tension in the combination of the entire three processes.

The summary of this is that machinery builders send out a universal size trumpet and while that size might be exact for one plant, the conditions may be just the reverse in another plant, so that it remains for some person that has the right amount of judgment to determine just what shape taper and what size at the extreme base the bore should be for the weight of sliver used in each particular mill.

No doubt "B. C. A." is asking by this time, "What has all this got to do with setting rolls on my spinning frames?" And I answer him by saying, "Everything in the world," for a sliver that is drawn improperly, or one with a tension that has allowed a stretch, or with a trumpet bore that has been too small and of the wrong shape to allow the sliver in question to pass through, constitutes the basic influence of twist injectors. Then when twist has been put in, rolls cannot draw what is nearly a wire. For good drafting the slivers and roving must be soft but strong, and drawing frames as a rule are the machines that inject the real troubles into a speeder and spinning department.

Lofty or light-bodied cotton is a very poor investment and it is always a wonder to me why a manufacturer will allow his buyer to furnish a cotton of this type for his plant. The staple may be exact, but there is a greater quantity of fly, and the rolls set more readily upon it and the third and fourth rolls in the drawing should be readjusted so that the pressure tension (with a rule) *just barely releases* the bulk tension and then they should be re-set when the heavier bodied cotton comes in again.

The first and second rolls on drawing, slubbers, first intermediates, second intermediates, jacks and spinning frames should all be set as near to the length of staple as possible. Beginning with the drawing frames with ⅛ inch over the staple, it should be gradually reduced until the spinning frame is barely over the length of the fiber. All rolls behind the second roll in all machines should be set according to pressure upon the sliver between the rolls. The fact that the sliver will give under a slight pressure is no assurance that the rolls are working upon the tip ends of the fibers and not upon the top surface of a so-called mass of wires. When rolls are too close the bulk between them is so thick that the top and bottom rolls never touch one another, thereby losing their power to draw. If spread to "pressure tension" the top and bottom rolls get the opportunity to connect with one another, as the distance between the pairs of rolls is greater than the staple and bulk, thus allowing perfect drawing.

"B. C. A.'s" statement that the roving is being wound on the bobbins hard assures me that the twist is the trouble. The situation may be as I have tried to illustrate—that is, it is possible that the carder has been forced to insert twist to hold his work together because his cotton is of a weak nature. But if the cotton is right as to strength, either the drawing frames are weakening the sliver, making thick and thin places in the sliver which must be extra-twisted, or else the carder has allowed his speeders to continue to operate with excessive twist after a better grade of cotton has been run into his regular work.

A. B. C. (R. I.)

EDITOR COTTON:

Before replying to the questions of "B. C. A. (N. J.)" in the December issue, I want to take this occasion to point out to the inquirers to this department that in order to get the best answers and at the same time save a great amount of space, they should give all factors in the case. "B. C. A." wants to know the cause of roving coming through the rolls on a spinning frame without being drawn. When I read his questions, the following questions immediately suggested themselves to me:

Is he running single roving or two into one? What hank roving is fed? What hank running to make 4s, and what hank running to make 30s? What is the twist per inch in each hank roving? What draft to make 4s, and what draft to make 30s? What is the speed of the front roll when running 4s; when running 30s? Is he using single or double boss rolls? Are his weights hung in the notch at the extreme end of the lever?

All of these factors are necessary to properly answer his questions to the best advantage.

When roving comes through the rolls without being drawn, on fly frames, ring frames or mules, the cause is due to the amount of resistance offered to the front top roll. The remedy is to remove this resistance.

This case looks to me as if the cotton was too wiry. However, if I was "B. C. A.", I would go at the trouble in this way: See that the draft on the ring frame does not exceed 7 for single roving and 12 for double roving. Place the roving on the floor and reel off at the height of 40 inches. If the roving will reel off without breaking, there is too much twist. If the roving breaks at about ¾ of the layer, it will give the best results. Stand the bobbin on the head end. There is a great deal of difference in the

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amount of twist that should be inserted in a certain hank roving when using fluffy or wiry cotton. However, this test is certain, and when the roving breaks at the point mentioned, the roving can easily be drawn, and I assure "B. C. A." that it will not break back in the creel.

Again, this may be a case of mixed staple. A fiber or two is enough to check the front roll in case of wiry cotton. In such a case the only remedy is self-weighted rolls or a wider setting.

In regard to the roving being wound on the bobbin very hard, this is a help instead of an evil; that is, if the compactness is not due to dry rolls or tight tension. When a bobbin is wound very hard by the pressure of the presser pad, a twist per inch almost equal to the figured twist is secured. Besides, the more pressure at the termination of the presser pad, the less amount of twist escapes and the twist per inch is more uniform, which is desired in this case. Wash (Conn.)

EDITOR COTTON:

From what "B. C. A." says, it is very possible that he is putting too much twist in his roving. The fact that he finds it necessary to open the rolls wider than standard would indicate this; also his last remark that "The roving is wound on the bobbin very hard" should show that he is putting in plenty of twist.

Since details are lacking in his question, it will be impossible to make specific suggestions. He fails to mention the hank roving used for the different numbers of yarn. I speak of this because a great many things, not apparent to the writer, may be responsible for his hard ends.

I am giving below the twist for roving that I have found to give the best results in both carding and spinning.

Taking a 3.00 hank roving as a base, and using 1.30 as a twist multiplier, we have $\sqrt{3.00} = 1.732$. Then, $1.732 \times 1.30 = 2.25$ turns per inch. Of course this must be varied slightly on lighter or heavier roving, but in no case up to 9.50 hank roving should the twist multiplier exceed 1.40.

"B. C. A." speaks of taking the weight off the middle roll. In this connection let me say that it has been my experience, using the twist for roving suggested, that I get better results by running a difference of two teeth between the head and foot and draft gears on all counts heavier than 17s and three teeth on counts from 17s to 30s on the spinning frame. B. R. B. (S. C.)

EDITOR COTTON:

"B. C. A." asks the question, what is the cause of roving coming through the rolls on a spinning frame without being drawn, and presents his own difficulty in this connection, asking for suggestions as to remedying it.

The first thing that comes to mind is that the roving contains too much twist. All that is necessary is to have twist enough to draw the roving from the bobbin, in the creel, to the back rolls. This may be had by using a twist multiple of 1.2 multiplied by the square root of the hank roving being made. I have found this to be enough in 95 per cent of all cases where 1 1/16-inch cotton is used.

The roll being grooved is caused by the hard twist not allowing the fibers to be drawn. It would be impossible to run the roving so made without spreading the rolls or lengthening the draft and in some cases doing both.

Another cause of this roving coming through without

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being drawn could be in the stopping of the traverse rod. Sometimes the traverse arrangement will get out of adjustment and the roving will all run through the rolls in the same place, and the continual wear on the leather roll will cause a channel, and when a roll becomes so channelled it is impossible for the fibers to be gripped between each pair of rolls, as the part channeled will be smaller in diameter than the rest of the roll. This will give the result described by "B. C. A."

Too much care cannot be taken of the roving traverse rod, as there is not only yarn spoiled, but a great many rolls ruined also, and these are an expense which should be kept at the lowest level. This rod moving so slowly sometimes deceives the repair men and should be looked over quite often by the overseer and second hand to make sure that they are all operating properly.

The last statement made by "B. C. A." that "the roving is wound on the bobbin very hard," suggests yet another possible cause. If the top rolls on the roving frame are not properly cleaned and oiled they will cause a drag and will not revolve at an equal surface speed with the lower roll. This drag will cause the roving to have more twist than the gearing figures and the bobbins will all be very hard. I have seen this happen. I have also seen the same trouble as this spinner is having, and in the investigation for the cause the spinning frames were found with a draft gear on that was considerably too large for the counts being spun. After the proper draft gears were put on these frames practically all of the trouble was overcome, the rolls that were channeled were changed at once.

The first remark that will be made by the reader is that the overseer was not on his job, but I do not think that is always the case. I have known of second hands who, unknown to the overseer, have changed these draft gears to satisfy the complaints of some of the operatives. I have found that one of the best ways to avoid this is to not have any spare draft gears around the spinning frames, all being locked up in cupboards for this purpose.

Carder (Mass.)

A Question About Bobbin-Lead Frames.

EDITOR COTTON:

In my letter on "Taking Out Twist on Fine Speeders" in the June number of COTTON, the following statement was quoted from a letter which I had received from one of the fly frame builders in this country: "ANOTHER factor in this complicated problem is that the pressure of the paddles on the bobbin is nearly sufficient to keep the spindles up to speed after the frame, as a whole, has been put up to speed, even though at that minute the train of gears driving the spindles from the jack shaft were disengaged. It seemed to us that this would be true; we tried it and demonstrated it to be so."

Very recently I had the pleasure of visiting a textile school, and while there I was surprised to hear the statement made by one of the instructors to a group of students claiming that the pressure outlined in the letter I received from the builder was a great aid to the bottom cone and cone belt. In this letter, I am going to try to clarify two points which I think will prove that the bobbin-lead is the wrong system—and I have very little fear of contradiction.

We all must admit that the pressure is very great to be able to drive the spindles when the frame is up to speed. We all must admit also that no pressure exists when the frame is run at a very low speed or when stopped. Therefore, when the frame is up to speed the tension or pull on the strand is between the presser and the bobbin, and when run at a very low speed, the pull is then between the surface of the bobbin and front rolls. So we have two tensions on every bobbin-lead fly frame, and on this point there can be no argument. After doffing, the tension is generally slack, or should be.

With this in mind, I would like to have the readers make the following test: After doffing a fly frame, stand erect, and with one hand turn the frame. Next, when the set is nearly filled, make the same test, and it will be found that more power is required to turn the frame. Of course, every defender of the bobbin-lead frame would say, the weight of the bobbins is the cause. Very well, then let the reader wait until the frame doffs, run the ends over and make the same test, and it will be found that the frame will turn as easily as in the first test.

What is the cause? It is the tension that exists on most ends, and the same cause that takes up the slack immediately when a bobbin gear is turned back.

For the purpose of illustration, let us assume in this case that the length of roving delivered in a given period of time is ten inches. In the bobbin-lead frame, a point on the surface of the bobbin must move just ten inches farther than the eye of the flyer presser pad during the length of time that it takes for the front rolls to deliver ten inches of roving.

Now, please be reminded of the amount of pressure existing between the presser pad and bobbin when the frame is up to speed, and the ten inches of roving in question is drawn from under the action of the presser pad by the bottom cone, thus offering a great amount of resistance to the cone belt.

Now, if a difference in power exists when the frame is turned by hand from the start to the ending of a set, as outlined (due to a number of tight ends) then what additional power is required to pull the roving from under presser pads having great enough pressure to turn the spindles? Perhaps this can be answered by the advocates of the bobbin-lead system.

Wash (Conn.)

More About the Care of Belts.

EDITOR COTTON:

In the October number of COTTON, "C. L. S. (N. Y.)" has brought out some important points regarding belts and their care, in the form of questions. Apparently he believes that few carders keep records of their belt slippage, and I will agree with him on this point, but some do, and I believe the advantage gained is enough to warrant more men adopting the system.

A general percentage of belt slip is very hard to determine as there is such a variance of conditions, but I consider a slippage of more than 4 per cent as excessive on any belt, and that a belt with such a slippage needs attention. In some cases it will be found that there is no slippage and the only loss is the creep of the belt, while in other cases the slippage might be as high as 15 per cent, and all manner of effort cannot reduce it to less than 10 per cent without putting on a wider belt. In regard to

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belt data, I believe every man must work out his own problem, for I do not think any man could tell me what slippage I should get in my room when he is running another room in another mill.

I have no record as to how much slippage increases as the fly builds up, but will cite the instance that proved this fact to me and interested me in belt slippage. My cards were getting ahead of the drawing and were stopping for cans. I had the drawing frames looked over, but everything was reported as being okeh. A spare girl was put on the backs to help push the cotton through, but still they had all they could do to keep ahead of the cards. Upon further investigation, we found the drawing frames in the back line were under speed. There were four frames being driven by a 2½-inch double belt running a quarter turn over idlers. The surface of that belt was completely covered with fly, for the reason that the fixer had neglected it for a couple of weeks.

This instance proved to me that fly caused slippage and I started a general investigation of belts. Some double belts were found to be opened up, that is, split apart, for distances varying from one to three feet. This was caused by careless oiling of idler bearings, and the oil had attacked the cement and opened the belt. Theoretically, oil should never injure a belt, but in practice it is oftentimes used to excess and the belt is injured.

In regard to the question, "How often should a belt be cleaned?," I can only say, "As often as it needs it." This may be once a week or once an hour. The static electricity is particularly bothersome in my card room, and recently some cards were moved to a new addition and it became necessary to clean the belts twice a day whereas they were formerly cleaned once a week.

If "C. L. S. (N. Y.)" will refer to page 38 of November COTTON, he will find a letter from another carder who evidently experienced troubles similar to mine.

I do not use the bicycle drive, so I cannot give any facts regarding it.

I think belting is generally given less attention than should be the case, but it is an individual problem and no statistics can be given as guides. M. W. H. (Mass.)

The Making of Ratine Yarns.

EDITOR COTTON:

I am planning to manufacture ratine yarns at my mill, using 6s and 20s yarn. It is my understanding that this work can be done on our present machinery by making some slight alterations. I would very much appreciate having the readers of your department entitled "How Other Men Manage" write some letters therein giving full detailed information as to the best way to make this ratine yarn from the numbers indicated.

For their information, our roving frames are of Lowell, Whitin and Woonsocket make. The spinning frames are Lowell and Whitin, and the twisters are principally Lowell and Whitin, although I also have a few Draper, Fales & Jenks and Collins.

I shall appreciate prompt responses with full details from any readers who are familiar with this class of work.

E. L. L. (Ga.)

Replies to Card Room Questions.

EDITOR COTTON:

The questions submitted by "Rocky Road (N. C.)" in COTTON for December are all practical and interesting.

In regard to his first question, "Rocky Road" and all practical carders must admit that the cause of any fly frame running over at the bottom is due to the bobbins being raised slightly higher than the eye in the presser pad. There are many defects that will cause this. If the tension is too tight, bobbin gears here and there will raise and cause running under. Dry bobbin gears will also raise the bobbins.

If the trouble is in the builder, it can be traced only to the lower jaw and also to the lower contact dog. Many contact dogs have hardened plates riveted on their working face, and any slight play will cause running under. Again, if the lower jaw is loose or defective in any way, this will cause the same trouble.

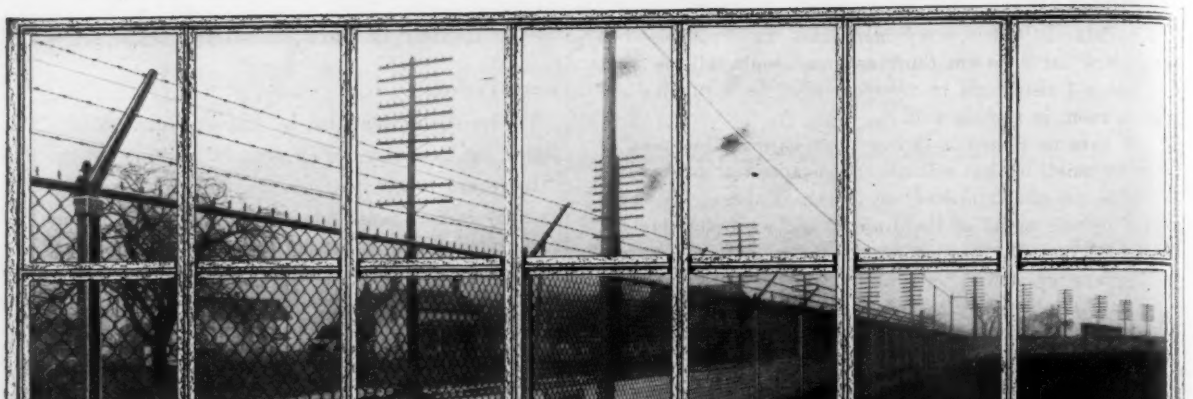
All American builders wear on the top and lower ends of each jaw, and the point of change becomes so rounded that the contact dog, aided by the contact spring and a very slight play in the builder or screw motion, slips under the jaw before the completion of the traverse. This may continue for many layers, when the jaw is made to occupy a different and perhaps a firmer position; thus the rail or carriage makes its full traverse and the trouble in question results. To determine whether the trouble is in the contact dog or builder, "Rocky Road" should rub the working face of the lower jaw with emery cloth.

In reference to changing the lay gear, "Rocky Road" should first consider the following facts: Excessive changes of twist, hard or soft, will effect the traverse gear required to produce best results. Therefore, judgment should be used in the selection of the correct gears for various sized rovings, and this judgment should not be governed by defects that may happen to other parts of the frame, but instead by the following rule for traverse: Number of layers to the inch in length of bobbin = $\sqrt{}$hank roving. Square root of the hank roving times 10 = layers per inch in traverse. $\sqrt{1\frac{1}{2}}$ hank = 1.2247 $\times$ 10 = 12+ layers.

When we speed up the carriage we reduce the coils to the inch, and this, of course, will create a slack tension; that is, if the proper tension was attained before the change.

There is no question but what a fast running rail will help, but not with only a change of two teeth.

Running over or under the bobbin is often caused by having too many coils to the hank. The coils ride over the preceding ones, and when this occurs on the change of the traverse, we have the trouble described, but on both ends of the bobbin. If the trouble is due to a slight dwell in the carriage, reducing the coils to the inch would help some. In fact, it should be clear that a larger lay will help the evil known as coil riding or flushing over. The only effect that would result in remedying the difficulty by a change of two teeth in the lay gear would be that the proceeding coils would lodge between the preceding coils instead of riding over them and flushing over. "Rocky Road" must admit that changing the lay gear to remedy the trouble is not practical. We are governed by rules,



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and rules are like laws; if we get out of line with them, we pay.

In regard to the second question, it must first be stated that the problem of the regulation of the "air current" as applied to pickers is a very important one and much depends upon it for the production of a clean lap without the loss of good cotton and also an even sheet that will unwind at the next process without splitting.

The first point for "Rocky Road" to consider is the influence which the speed of the fan bears on this. While I may say that the speed of the fan is about 1,000 r.p.m., it must be understood that only an approximate statement is made, because like many other speeds, it must be determined by practical results.

Generally speaking, the "air current" must carry only the cotton fibers and deposit them onto the cages, and at the same time the heavier impurities must be permitted to fall through the grid or grate bars. If then it is found that too much good fiber is deposited with the waste droppings under the beater box, it may be attributed to either the beater revolving too quickly, the grids being set too far apart, or the speed of the fan being so slow as to cause a weak current of air and thus failing to carry the fibers away before they were permitted to fall between the bars. On the other hand, if the lap from the machine contains too much seed, trash, etc., the causes may be directly the reverse of the foregoing, that is, the beater may be revolving too slowly, failing to thoroughly open the cotton, or the bars may be too close together, preventing the impurities from passing between them, or the fan may be running at too high a speed and creating an "air current" sufficient to carry the heavier impurities with the cotton in place of allowing them to fall out while passing over the bars. Therefore, if the beater is run at the customary speed, a medium fan speed is best, and will extract more foreign matter.

Taking up the third question—asking whether there is a remedy that will stop small particles of cotton seed and other foreign matter from lodging in the card flats—I want to say that there is no other evil in a cotton mill where an ounce of prevention is worth a pound of cure more than here. The trouble is due to scattered moisture that finds a resting place in different spots on the flats. This small amount of moisture will create enough rust to cause the smallest particles to cling around the wire. This is not discovered by the naked eye until the foreign matter is flush with the point of the wire.

Clogged flats should be thoroughly cleaned. Then the burnishing roll should be covered with coils of burnishing fillet about five inches apart, spirally, thus having only about one-fifth of the wire playing through the teeth of the flats. This will, in time, remove the rust.

The brush should be run two or three days at a time every two months, and should be run at a speed double that of the grinding roll; in other words, a one-half size smaller pulley should be used. This is a sure cure for clogged flats, and it is very little trouble.

Wash (Conn.)

The bursting of an electric light globe in the opening room of a cotton mill caused a loss of more than $300 in damaged cotton.

Why not buy lamp guards; they cost less than fires.

Wants to Increase the Breaking Strength.

EDITOR COTTON:

I am having trouble with the breaking strength of our yarn, and I would like to ask through your Practical Discussion Department for suggestions that will help me remedy the difficulty.

We are making 30s warp yarn, from 1-inch American cotton. The lay-out of the carding department is as follows:

Weight of picker lap, 13 ounces.
Weight of card lap, less 5 per cent, 5403 gr.
Draft of card, 108.
Weight of card sliver, 50 gr.
Doublings on first process drawing, 6.
Draft on first process drawing, 6.
Weight of first process drawing, 50 gr.
Doublings on second process drawing, 6.
Draft of second process drawing, 6.
Weight of second drawing sliver, 50 gr.
Doublings on third process drawing, 6.
Draft on third process drawing, 5.
Weight of third drawing sliver, 60 gr.
Draft on slubbers, 4.32.
Hank roving of slubber, .60.
Doublings on intermediates, 2.
Draft on intermediates, 5.67.
Intermediate hank roving, 1.70.
Doublings on fine frames, 2.
Draft on fine frames, 6.47.
Fine frame hank roving, 5.50.

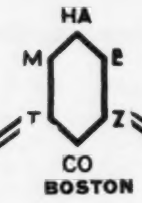
I have doubled two on the spinning frames, with a draft of 10.91. The spinning rolls were set to 1 1/16 inches. I thought this was too wide and closed them up to 1 inch. I was putting in 4.50 times the square root twist, and am at present putting in 5.00 times the square root, in an effort to improve the break, but I can't see any difference. On our frames with short rolls the weight was only 2¼ lbs., so I tried a frame with a pound more weight on the rolls but it didn't improve the breaking strength any. The average break on this yarn is around 45 pounds, and the average size of the yarn is about 29s. The yarn is very uneven but it sizes about right.

I shall be very glad to have the suggestions of your readers as to the location of my difficulty and the steps I should take to remedy it. E. H. (Mass.)

Long and Short Card Drafts.

EDITOR COTTON:

In the November number I notice considerable discussion as to which is more preferable on cards, a long draft or a short draft. I would like to say that I think it is better always to run a slow doffer speed than to "heavy up" on the lap and draw more. However, in some instances—and most likely in the case under discussion—the carding is limited, and to cut the speed of the doffer to get quality would of course reduce the carding production. In a case of this kind, it is far better to increase the weight of the lap and draft longer than to lighten the lap and shove it through the card. The licker-in cannot do its duty in the latter instance as the carding per inch that the licker-in should do is reduced, so it is better to feed the



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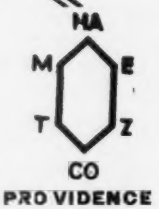

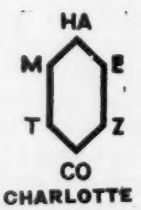

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lap slow and let the licker-in do the work it is supposed to do before laying the stock onto the finer wire in its uncarded condition. A close study of the card will convince us that the draft on a card is not as injurious to the fibers as a roll draft. It is called a draft because we can lighten or "heavy up" here the same as on any other process, but the draft on a card has a different drawing effect to the frictional roller gripping the fibers tightly, as the other rollers are pulling fiber after fiber by each other. This kind of drafting has a weakening effect on the small fibers, and especially where there is a high roll speed.

On the card, however, it is different. Here we have a draft, but it is in a more relaxed form. In other words, the best way I know of to explain it is that the fibers are not under any gripping strain and do not have any rolls gripping them rigidly, and they are more loosely scattered and gathered and laid straight by a surface drafting without the bulk being so confined after it leaves the licker-in. It is nearly a floating draft, swapping ends as it passes through under the top flats, and the combination of the air from the cylinder as it is broken when it passes the close setting at the doffer has a tendency to scatter the web, and it is laid in its more lightly knitted form on the doffer. As we all know, if we will only think for a moment, the air current caused from the centrifugal force of the revolving licker-in and cylinder has a lot to do with the quality of the carding.

So I say: feed slow and get the licks per inch at the feed rolls, as the licker-in is a very important factor, and its duties must be performed if we are to get results.

J. F. L. (Ala.)

Replies to Questions on Spinning Draft.

EDITOR COTTON:

Replying to the questions of "B. E. (Texas)" in the December number:

The question of length of draft in the spinning room and its effect on yarn as regards its strength and quality, or appearance, is like most problems in the mill in that it is governed to a great extent by the grade of goods manufactured.

From the spinner's standpoint, it is quite a different matter than when taken from the viewpoint of the carder or the mill owner. Most spinners prefer a short draft; most carders, if asked how to draft in the spinning room, would prefer a long draft. Another angle is the cost of manufacture—the longer the draft the more the cost of production.

What is a long draft and what is a short draft? A draft of 10 is long if a low quality, cheap grade of goods is being made. A draft of 10 is not long at all if the roving has passed through several processes in the card room not ordinarily used in the manufacture of cheap yarn. For example, if some Texas cotton like that we see here in Georgia is being used by "B. E.," he is drafting entirely too much on his 16s yarn, unless he has carded and combed the very deuce out of his stock. However, he states he is spinning from double roving and it is presumed that he is not going to the expense of using double roving on low grade cotton.

Of course, anybody knows that a too long draft will cause the twist to run to the thin places and leave weak spots in the yarn and a too short draft will let thick places under the rolls which cause frequent breakage and bad running. Both extremes have somewhat of the same effect. Of the two, the longer draft is to be preferred.

Observation of mill reports made out by our friends in England leads me to believe that the English will run a little shorter draft on the same stock than we do here in America. This, however, will have to go along with the well known fact that the English card much better than we do in America.

As for "B. E.'s" personal problem, and a guess at the kind of goods he is running from his double-speeder roving, I would say that when he gets below a draft of 9 or 10 he is not drafting sufficiently. By "sufficiently" is meant the three viewpoints mentioned before: The carder's, the spinner's, and the cost of production along with the desired quality.

Nemo. (Ga.)

EDITOR COTTON:

In answer to "B. E. (Texas)," I will give my opinion on drafts as follows:

Draft is started in the picker room, and, as I understand it, is for the purpose of drawing out the cotton in the different processes and smoothing it out for a good even yarn.

It is possible to run the numbers referred to by "B. E." from a 3 hank double roving and get very good results, but I should think if he has a good even draft on his drawing, slubbers, intermediates and fine frames, he would get better running work and good even, smooth yarn if he would make some difference in the hank roving for the different yarns.

If I was making "B. E.'s" yarns, I would make a 2.80 hank roving for the 10s and 12s and use the 3 hank roving for the 14s and 16s. I think this would give a more even draft. Some time ago we were spinning number 7s yarn from 1.25 hank roving single, and when we figured our draft on the different processes we found that we were not getting an even draft all through. I thought that our intermediate and spinning drafts were nearly the same. We changed our roving from 1.25 to 1.10 hank, and we get better running work and stronger yarn than we did with the previous arrangement.

I do not know what hank roving "B. E." is making to make his 3 hank from, but I believe that if he will figure his drafts from drawing on through the slubbers, intermediates and fine frames, and will make some difference in his roving for the different numbers, he will find that he will get better results. A 2.80 hank roving for 10s and 12s will give him a little more production than his present arrangement, and I believe better running spinning on these numbers.

I would like to hear how "B. E." comes out with these suggestions if he cares to try them, and if he does not, I would be glad to have him express his views on the subject.

Superintendent (Ga.)

EDITOR COTTON:

The question of drafts is very interesting and I am giving my point of view on "B. E.'s" question in the hope that others will do the same.

"B. E." does not state what kind of cotton he is using,

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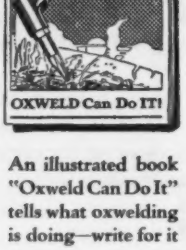

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or what kind of material his yarn is going into, so I assume that he is using 1 to 11/16 inch Texas, making heavy sheetings.

If he is using a draft of 10.6 on his 16s and 6.6 on his 10s from 3.00 hank double roving, he certainly ought to be getting good even, strong yarn, but I doubt if the expense met with in making it this way is justified by the type of fabric into which the yarn is going.

If "B. E.'s" mill is otherwise hung up all right, he should be able to get very nearly as good yarn from single roving, if even it would be necessary to split at the intermediate and make two sizes of roving in order to accommodate the changes from 10s to 16s yarn. If he can make this change and use single roving, he will save enough money to be able to put more into his cotton and carding course and still save money.

If other readers of COTTON do not agree with my viewpoint, I hope they will write in and give their opinions.

G. C. (Mass.)

Advertise Cotton Products.

EDITOR COTTON:

The success of the orange growers of California is a very often quoted example of the well known phrase "It pays to advertise." These growers were once faced with that nightmare—overproduction. People were not eating as many oranges as they were able to grow. In fact, it looked like people were beginning to dislike oranges. These growers did that which seems so difficult for everybody but Bolsheviks to do—they got together. It was agreed by all that something had to be done to get people to again like oranges. Now, every cotton mill man who reads magazines can recognize the California orange growers advertisements of "Sunkist" oranges as quickly as he can a spinning frame.

It looks like people are beginning to dislike to use things out of cotton. We are producing this year a crop only half as large as we could produce were we brave enough to do so. This seems the only way of getting the world to realize that cotton is not such a bad material after all. However, it would be a lot better if we could get this fact across with a cheaper sales policy. Suppose the orange raisers decided that they would just cut down one-half of their trees and let people do without oranges for a time. What would be the result? We would miss them about two months and go ahead making lemonade.

Of course an essential industry or product is not so easy with which to dispense. It would require a good while to get some cheap material to take the place of our "heavies" when the summer sun shines. But we in the South will never have anything more than a Ford and a movie ticket as long as we content ourselves with just raising enough cotton to keep the price above ten cents. There is no heavy brain work to figure that 16,000,000 times seventy-five dollars is more than 7,000,000 times one-hundred dollars. (As I write this the ticker says twenty cents a pound. Let us hope we can sell the whole 7,000,000 for this price!)

To advertise we have first to sell the product to the employees of the business. If they do not think it as good as the competitors' goods, it is certainly going to be a difficult matter for the traveling salesman to convince the outsiders that it is better.

Take cotton fabric belting for example. There are very few cotton mills that ever use anything but leather belts. If it were very much more economical to use leather belting, it would be best. As a matter of fact, fabric belting is a paying proposition anywhere in the mill where it does not have to be shifted by frequent stoppage. They are fine for countershaft drives. (I do not sell belting, but any mill man can substantiate this by a trial.) Now if there is anything good at all about fabric belting and there must be, for there are many millions invested in its manufacture, it is up to us to go the limit with its use. This is true of anything that is made of cotton which has competition from other raw materials. Of course there will be lots of fellows who see no further than the walls of their mill who will say, "What is it to me if the makers of cotton belting or any other cotton product prosper?" It is just the difference between his getting a bare living and his getting a little more than a living, to raise this standard of living.

This example does not seem much, but suppose every mill would put a fabric belt on every counter drive. The moral effect alone would help, besides the fact that about 300,000 more bales of cotton could be raised every year without anybody crying over-production. This, however, is just to illustrate. There are more important articles which would be very greatly helped in their consumption. It would not be a joke at all if next summer every man south of the Mason and Dixon Line were to wear nothing but cotton clothes. We could allow the auto mechanics a silk shirt or two and the girls silk stockings. (We would be willing to lose a little money on the last named article.) The effect of such a campaign would be electrical on the market.

There could be a successful campaign to do this very thing, if every southern publication would devote one page of each issue to its propagation. This would put us in the same condition as a grocer buying his groceries from himself rather than his competitor. It is usually an economical method for a grocer to feed his own family.

The electrical machinery manufacturers of this country have expensive laboratories and men whose sole purpose is to discover more and better ways to use electrical machinery. Electrical machinery is a broader term than cotton fiber, but the products of cotton fiber are capable of many extensions and greater usage. If the electrical machinery manufacturers fail to put an individual motor on every machine like they tell us cotton mill people to do, they are not sincere. If we people whose food and shelter depend on the growth and conversion into useful articles the staple called cotton, do not use the products of this staple to the very limit, we are not sincere.

Let us prove to the world that we are sincere and tell what an excellent material is cotton. G. I. B. (Ga.)

The Ideal Electric & Manufacturing Co., Mansfield, Ohio, have just issued two bulletins—one on motor generator sets and one on electro plating apparatus manufactured by them, known as bulletin No. 106 and 107 respectively.

"Do it today" is a good motto, but the chap who can say "I did it yesterday" has a better one.

THE NEWPORT COLORS

For Cotton and Cotton and Silk

The Best Developed Blacks
Newport Developed Black 2 B N
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Fast, Bloomy, Intense.
Alike on Cotton and Silk.

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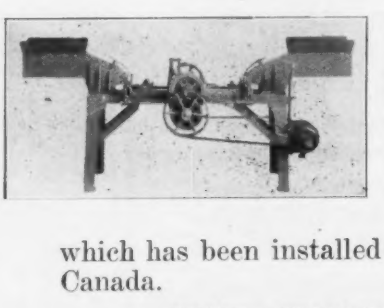
START THE NEW YEAR RIGHT

1922 is going to witness the keenest kind of competition in all lines of business—especially in the Textile line—this competition will call for greater and more economical production.

To meet this competition successfully requires the installation of the latest and most improved Labor Saving, Time Saving, Waste Saving machinery.

Such a machine is the



"UTSMAN" QUILL CLEANING MACHINE

which has been installed in 295 Textile Mills in the United States and Canada.

START THE NEW YEAR RIGHT—INSTALL AN "UTSMAN" QUILL CLEANING MACHINE—CATALOG FOR THE ASKING.

THE TERRELL MACHINE COMPANY, Inc.

Charlotte, N. C.

Favors an Employment Manager.

EDITOR COTTON:

What are the duties of an employment manager? Probably the best definition that has ever been given in answer to this question is, "The duties of an employment manager are to secure and maintain an adequate working force." There are times, notably during the scarcity of help in the war period, when these duties are clearly among the most necessary in any plant. At other times, even if not so apparent, the duties are there, just as necessary, and they must be performed by somebody. It is impossible to operate any plant without a working force, and this force must be secured and maintained by somebody; why not by a man who makes it his sole business?

If the manager of a mill wants a purchasing agent he does not take the overseer of weaving, however good he may be at his particular trade. He selects a man familiar with the market, capable of going out and buying the right kind of supplies at the right prices.

If the manager needs a master mechanic he will hardly pick an overseer of carding. The fact that a man is a good carder is no indication that he will make good on a job that calls for knowledge of machine practice, carpentry or building.

Who, then, should a mill manager select for his employment manager? The answer is obvious. The employment manager must be a man who can and will devote his time to solving the problems of keeping the worker on the job, one who can see that the proper first-aid or hospital equipment, as the size of the plant may require, is installed, one who can start the ball a-rolling for the proper recreational facilities, plant newspaper, bowling league, baseball team, etc., one who can look out for housing facilities and see that workers are not kept away because they have no place to board or no house in which to live. All these functions and others are performed to a greater or lesser extent by someone.

The overseer as a rule is interested only in the results of these things. He usually has neither the time nor the inclination to consider how these things affect the working force. He is "sore" when his skilled worker quits or he has to hire a poor class of help, but generally it is not his fault. If he had to buy his own supplies he would be "up against it" the same way, but the purchasing agent does that for him and if the purchasing agent does not have the right kind of supplies when they are needed, the overseer will soon make complaint and conditions will soon be remedied. When the overseers of a mill find that their help is not so good or so steady as in the neighboring mill which has made an effort to solve the employment problem, to whom can they make their "kick"? Who is responsible? Without the employment manager there is no one and the overseers must suffer for circumstances over which they have no control.

Then again, there is the matter of records. When a man who has been employed some years previously applies for a job it is hard to remember whether he was good, bad or indifferent, whether he loafed much or worked steadily, or whether he should be employed again. More important things will crowd the mind of the man in the mill and he cannot clearly recall these things. If some record had been made at the time the man worked in the place, at least telling whether he quit, was laid off, or discharged, how much poor hiring or rejection of good men would be prevented!

A good employment manager will soon learn the type of man and the experience required by the overseer for the various jobs and will see that he gets the kind of a man he wants.

It is now considered the best practice in employment work that no one is hired until the foreman accepts him and of course the foreman may "fire" a man who is not fitted to his job. However, after an experience with the right kind of employment manager the overseer will probably find that his help are suited to their jobs and that he does not need to "fire" them and this at no trouble to himself. On the other hand, the boss may need say a speeder fixer, and he knows that John Brown is a good one. How, then, can he secure him? Simply by requisitioning the employment department for one speeder fixer, John Brown, and if there is any way of landing John Brown, short of kidnapping him, he will soon be on the job.

One might write volumes on the benefits of an employment department if time and space permitted, but in closing let me say that the one big thing necessary for the success of the proposition is to engage a man who understands his business and can clearly demonstrate to the overseers that his functions do not take one right or privilege away from them, but simply remove some onerous duties and help them by leaving them free to direct the operations of their departments.

A. L. M. (Mass.)

Against an Employment Manager.

EDITOR COTTON:

"Wash (Conn.)" must have had some experience with employment managers, for I think he is entirely correct in his views as expressed in the November number.

I can see nothing that an employment manager can do only keep up a disturbance among the help and overseers. If a mill wants a good overseer, they should give him complete charge of his department, let him do all the hiring and firing, and hold him responsible for the class of help he has and then back him up. Then if he fails to get results, all the employment managers, service workers and nurses can do him no good at all, and the only thing to do is to let him go and get another man.

If the general run of mill help is hired by an employment manager, then when friction arises between them and the second hands, the help are very quick to tell the overseers and second hands that they had nothing to do with the hiring and that they will go to the employment manager and state their cases; and then in nine cases out of ten the help will add a lot to it, and in this way may leave the impression on the man who hired them that the overseers in the mill have it in for him becaues he hired the operatives, and thus create a bad feeling between the overseers and the employment manager.

Then, what good can a man do in this capacity? I can see nothing except added expense for his salary. The overseer can hire his help better than anyone else, for he knows what he wants.

You can talk to one of these employment managers

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Clock with case opened showing Dial in Place and Partial Registration.

with its special Waltham movement, its lock stations and its superior quality throughout, is especially desirable for mills and factories and for either in-door or out-door patrol.

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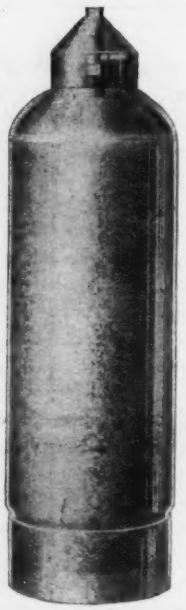

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SOUTHERN SALES REPRESENTATIVE:
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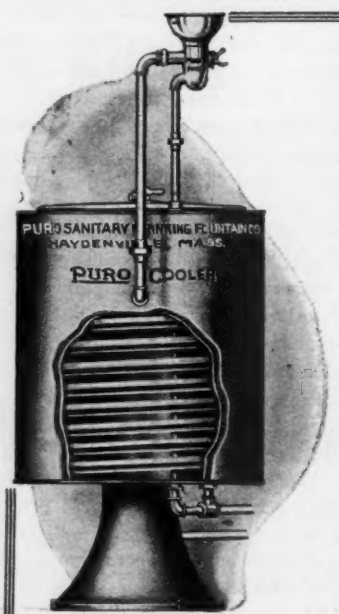

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A PURO Cooler with its PURO, JR. Fountain will keep your employees both healthy and happy.

Start a campaign now and clean out the "old tin drinking cup."

Install a PURO Cooler and thereby increase the productiveness of your employees.

PURO SANITARY DRINKING FOUNTAIN CO.
HAYDENVILLE, MASS.
E. S. PLAYER, Southern Sales Mgr.,
Masonic Bldg., Greenville, S. C.

and he will lead you to believe that it is a great thing for the mill. Of course. He is talking to hold his job, for he usually has a very soft snap.

Then who wants to be an employment manager, anyway? There is absolutely nothing to it. If a man has the ambition to accomplish something he certainly will not be satisfied with a job sitting around asking a man his age, where he has worked, what church he is a member of, etc. He will want to get on a job with a future in it.

I know of several mills that have nurses, welfare workers and service managers at quite a lot of expense, and other mills right around them that do not have these and are getting along just as well as the others, and have just as good a class of help, and a saving of several thousand dollars a year.

If a man wants efficiency in his mill, let him keep peace in the family, pay as good wages as he can, and demand an honest day's work. I am aware that all these jobs in the service line are more or less of an experiment, and I believe that it will only be a matter of time until they are all abolished. In fact, this has already taken place at some of the larger plants of the country, and I believe that a man who has been in this kind of work and has left it for something else, will say that there is nothing to it.

I am not a knocker, but am just expressing my opinion on the subject. I am willing to try anything there is any good in, but when I see that there is nothing to it, I am certainly going to turn it loose if I can.

Contributor No. 96.

Skeins and Winding From Skeins.

EDITOR COTTON:

In many mills there is no process so wasteful as that of skein building and that of winding. This is because there is not always the best of training given to the operatives for the proper handling of the skeins. There is another reason for wastefulness in connection with skein work, and that is the improper manner of building the skeins at the process of reeling. Therefore, I will take up in this letter the matter of reeling skillfully to build the skeins right, then follow up skein winding to show the correct manner of handling the skeins.

There are quite a few points well worth consideration in connection with the building of skeins that will unwind smoothly during the process of skein winding, so-called, because of unwinding the skeins and re-winding them onto spools, quills, cones or tubes.

The first matter to be considered is that of the speed of the reels. A reel will do its best work at a moderate speed. Nothing will ruin yarn so much as excessive speeding of reels. While a reel driven at excessive speed may be building a good appearing skein, without causing much breakage of the ends at the reel, the work may be quite ruined for the succeeding processes. The yarn will be overstrained and therefore robbed of its due elasticity which is so much needed for the making of strong yarns for varied purposes or for the weaving of fabrics.

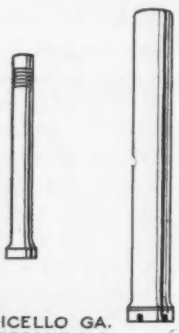
But, as a rule, an over-speeded reel not only strains the yarn, but it will also break a great deal of it during the process of reeling and be the means of filling the product with numerous knots which are very undesirable during all the succeeding processes. A reel should therefore be driven at a very moderate speed. And the tension given the yarn should be simply sufficient to prevent kinking and back-lashing. Both of these evils are to be avoided. Back-lashing will over-strain the yarns at many points and cause breakages which would not occur in subsequent processes if that evil had been prevented. Kinked yarns in skeins will cause much waste and bad work also on account of breakages. Kinked yarns will catch on guide wires and yarn eyes and if the kinks do get by, the kinky loops will spoil the finished product.

There are other very important matters to be considered at the process of reeling besides speeds and tensions. They are the matters of skein width, traverse speed, and the weight or size of the skein. Small, narrow skeins are preferable to large ones on fine work. On coarse work the larger skeins are preferable to the small ones. On fine work skeins should not be made narrower than 1½ to 2 inches wide. The weight should not exceed 2 to 2½ ounces. On coarse work skeins may be made much heavier according to the numbers. But they should also be made wider. Three inches wide is the narrowest that skeins should be wound on coarse ply work like 8s/3 to 12s/3 yarn. Also those of more ply. Fine work should not exceed 18 inches in diameter of the reel or 54 inches in the total length of the skein. While on very coarse work the skeining is done more economically on 24-inch diameter reels to make 72-inch skeins, or on 20-inch diameter reels to make 60-inch skeins.

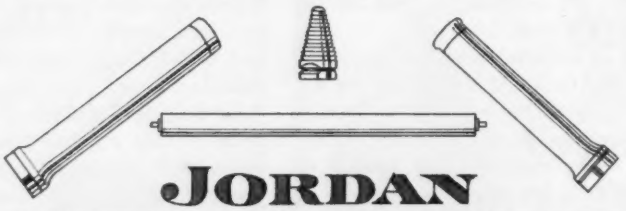
The traverse motion is very important. The speed of the traverse motion should be sufficient to cause the skein to be cross-wound onto the reel from one side to the other at least once at each revolution of the reel. The skein, in any event, should not be allowed to build without a traverse motion as is sometimes done. Neither should a slow traverse be tolerated. A fairly well speeded traverse motion gives the skein building a much-needed lease-like building motion which insures the building of a less waste-making skein. It will run off better. It will also be easier to find the end on the skein whenever an end is broken or lost.

Having prepared the skeins as they should be prepared, the next thing is to provide a proper place to care for them in perfect safety. A great deal of skein yarn is spoiled by improper handling. If skeins are to be laid aside for a time previous to baling or bagging, the best way is to place them on poles that are perfectly free from slivers or knot holes. Bagging skeins is a great evil. Much skein work is ruined and made fit only for the waste pile on account of being rammed and jammed into bags. The best parcels put up for shipment of skeins are those which are baled, the skeins first being twisted inwardly, like a twisted doughnut, a few times to preserve the circular shape or building of the skeins, but elongated some in order to make a neat package for the baling process.

Our next work is to handle the skeins properly for the unwinding while they are being re-wound onto spools, bobbins, cones or tubes. When the skeins are being removed from the bales or bags, they should be handled very carefully. It is preferable to place them upon poles. As wanted, they should be gently untwisted and also as gently pulled out straight without giving them a rough snap. The rough snap usually given skeins by the operatives is very undesirable. It strains the yarns and often causes many break-



MILLS AT
MONTICELLO GA.
AND TOECANE, N.C.



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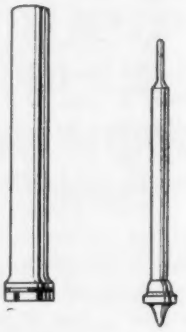

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Our Line of Automatic Loom Shuttles

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It will cut your cloth—fold the edges—roll it up and give you an exact measurement of every piece of cloth going through the machine.

It saves time, labor, machines and cloth.

YOU ONLY NEED ONE MACHINE where before it required two, and you get an extra strip from every bolt of cloth.

It cuts the corners of expense in every way and leads to more and greater profits.

THE ENORMOUS SAVING WILL INTEREST YOU.

Mail a card for complete information and prices.

When in need of special machinery, write us.

J. A. FIRSCHING, 614 Broad St., Utica N. Y., U. S A., Dept. "C."

ages, which should be entirely avoided. Every skein should have a band tied loosely around it opposite to where the two ends are tied together in a band.

The next important matter is to find out which is the inside and which is the outside of the skein. For, as has been well said, a skein, like a jail, has an inside and an outside and which is just as easily recognized. If, when laid out flat and then placed upon the wrists and held out straight, the skein shows no loose yarns or wavy effects inside the skein, then the skein is not wrong-side out. But if the skein is straight and tight on the outside and loose and wavy on the inside, it should be turned inside out. The loose band should be cut off, not broken off, as the act of breaking this loose band might catch on the skein coils and break or weaken some of the yarn. In like manner, the two ends, where tied together opposite the band, should be cut apart, and not broken.

The end on the outside of the skein will of course be the proper end to connect with the winding machine paralleling arrangement. The speed of the winding machine should also be moderate and not excessive.

Experience also proves that skeins make better work and less waste when they are placed on self-tightening swifts or individual reels which are made to turn on their centers. When skeins are placed on mechanisms which have a revolving wheel at each end of the skein the skein is constantly working its own passage during the entire process of winding by being obliged to revolve these wheels. At the same time the skeins are tossed against the spokes or cross bars of these wheels over and over again until the skein of yarn is all wound. This injures the yarn. It is much better to have the skeins resting smoothly upon individual reels which turn on their small spindled centers. These turn easier, and the yarn is not being continually tossed and ruffled until it is crinkled, chafed and weakened as it is by less gentle processes.

On number 40s yarn a 2-ounce, 54-inch skein will be 4,200 yards long. These 4,200 yards will make 2,800 complete coils in this skein. It must revolve 2,800 times in the process of unwinding to be re-wound. A skein of 60s yarn of the same dimensions as the 40s yarn will contain 4,200 coils and must therefore revolve 4,200 times to be re-wound. This shows the importance of handling a skein very gently during the process of winding. When a skein is unwound from the two wheeled holder system, if each wheel contains eight spokes there will be 16 spokes, each of which must be bumped against by the skeins 16 times at each revolution or 67,200 times in all during the process of being unwound. The wonder is that we have any yarn left after the winding process has been accomplished under this undesirable system. It stands to reason that skein yarn which is wound while the skein is riding at ease on individual reels of the self-tightening and self-centering type, will be less injured than when being continually jarred and compelled to shift contact upon the two-wheel system of unwinding the skein to be re-wound.

Lastly, the proper method of determining the damage done to the yarn at any of these processes is to test the strength of the yarn before and after reeling. Also before and after winding by each of the two processes mentioned. If the strength shows any weakening at any point, the process is surely responsible for the damage. If one process shows less damage than another that process is surely proven to be the best process. The idea is to reduce the strain upon the yarn and have much less breakage of ends, which in turn will reduce the waste-making elements, not only at the reeling process, but also at the subsequent processes.

H. D. Martin (R. I.)

Grinding and Setting Cards.

EDITOR COTTON:

There has been much written and said about the grinding and setting of cards, and I would like to express my views on these subjects and join in the discussion that is being carried on in your "How Other Men Manage" department.

According to my experience, which has been a varied one, there can be no set rule for every card. A man may set up two new cards side by side, grind them and then set every point the same and still not get the same results from them. I have seen card backs set the same on two cards, and one card would give good fly waste while the other would fill the box with white cotton so that the setting would have to be changed to get the desired results on this card.

There has also been considerable discussion on the setting of the feed plate to the licker-in. I would like to say something in this connection, but before getting into the subject, I want to say that in the past the licker-in has been the most neglected part—to be as important as it is—of the card. There has been too much of a tendency to let it go with the wire mashed down on it. Now if there is a place ½ of an inch wide mashed down on the surface of a licker-in, we don't think we can stand the cost of a new one just for this small place, but the efficiency of that licker-in is gone, and one of the best investments that could be made for the mill would be a new licker-in; that is, of course, to rewind the damaged one.

More damage has been done yarn by running a bad licker-in and by setting the licker-in too close to the feed plate than by any other one thing in the entire mill. When you see a licker-in set to a No. 7 gauge, if you will look into the spinning room you will find that they have weak yarn and that it is almost impossible to keep the guides clean. Of course, if the carder is setting for only his own benefit, he might get a little nicer looking web on his cards by setting close, but the fellow who has the running of the entire plant, and the quality of the product, at heart must look further than his cards.

Following are my recommendations for setting a card running on ⅞ to 1 inch cotton, which is about the average length of cotton used in our medium yarn mills in the South:

Set the feed plate to a 17 gauge, mote knives to a 10 gauge; licker-in to cylinder, 7 gauge; back plate between licker-in and flats, bottom edge, 22 gauge; top edge, 17 gauge. Set the top flats to a 12 unless the mill has a mighty good floor; then use a 10. I know a mill with two plants, one with a very bad floor, and the carder has the flats set to a 12 gauge in this plant; the other building has an ordinary floor, and he sets the flats to a 10 gauge. He gets the best results from the mill where he set to a 12 gauge, and after some experimenting he adopted a 12 gauge for this setting on all his cards, with very satisfactory results.

LEWIS

The fact that the leading textile mills are still enjoying the use of their original purchases made ten years ago proves the outstanding economy of the Lewis line of Box Trucks, Transfer Trucks and Baskets.

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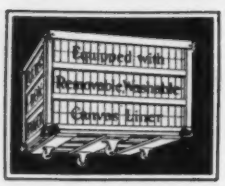

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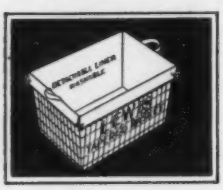
The Tapered Hand Basket is particularly adapted to the handling of lighter colored goods that must be kept clean in process.



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To proceed with the settings: Set bottom front plate to a 22 gauge; top plate, according to the amount of strippings desired; doffer, 7 gauge; doffer comb, 17 gauge. Then the carder should go over his cards and find the ones that are not doing good work and ascertain just the settings that need changing, for, as stated, oftentimes two cards will not produce the same results with the same settings. He should then change anything that needs changing, regardless of any set rule, only he must be sure *not* to get that feed plate too close to the licker-in. There is only one point on the card that I tell my grinders they must set to a rule, and that is the feed plate to the licker-in.

On going over a set of cards for the first time, whether new or old cards, a card grinder should grind around on his section once before trying to do anything except set the doffer and examine the licker-in. In this way he will become acquainted with his cards, he finds any loose clothing or high-sided cylinders or doffers, and so on. He must get the condition of each card impressed on his mind so that he knows each card like a book.

There never was a work more interesting than grinding cards. If a man only puts his mind on it right, he can always have something to work to, for he never gets it good enough. Each time he sets up a card he should try to make it do a little better than it did the last time, and he can almost always do it. Mike (Ga.)

Rejects Long Card Drafts.

EDITOR COTTON:

I notice that "Tom (Mass.)," in his letter under the heading "More About Card Drafts" in the October number, would have us adopt a hang-up that was rejected over thirty years ago.

In the first paragraph, he suggests, "Let us give 'J. S. B.' a fundamental rule to go to perfection with his 65-grain sliver." We will assume that by "fundamental," "Tom" means an essential ground work.

When he started his article, his intentions were doubtless good. However, some statements in his letter do not appear to be consistent with each other, for, in the fourth paragraph, he would have "J. S. B." increase his card draft "to 124;" in the eighth paragraph "to over 100;" and "to 140." It seems that "J. S. B." must toss up a coin to determine which draft to adopt.

In the fifth paragraph of his letter, "Tom" says, "'Wash' will also agree that good work can be had from a 65-grain sliver from a card."

"Wash" will not agree to any such statement.

A 50- or a 40-grain sliver will make much better work than a 65-grain sliver. The benefit of a light card sliver has been explained time after time in this department, by the writer and others. If a heavy sliver will give the best results, then why do mill engineers have a card to each delivery of drawing in their lay-outs?

Thirty or more years ago, it was common to find 50 cards to 75 deliveries of drawing, but now there are 75 cards to 75 deliveries, and very often the number of cards is double that of deliveries. Why all this initial expense if a light sliver is of no benefit?

And in this same paragraph "Tom" makes another statement with which I cannot agree when he says, "If a man must run certain weights it can be done, only he should be directed to get the best with what he has to do with." Now, is it not fair to assume that this is what "J. S. B." did? Does "Tom" intend to reject the laws of friction, moderation and compensation?

If I were obliged to run weights that would cause excessive drafting, I would resign and save my reputation.

If "Tom's" theory is correct, then a tremendous production is possible. Just think. An 18-ounce lap, 65-grain sliver on the card, 70-grain sliver on the finisher drawing and—I suppose—a .25 hank slubbing. Why not? If a heavy sliver is best in the preceding processes, it should also be best in the succeeding processes.

It looks to me like "Tom's" idea in writing the letter in question was chiefly to trap "Wash" by admitting a certain statement or test. I am going to prove it. "Tom" figured this way:

$$\frac{15.3 \times 437.5 \times .94}{140} = 44.9$$ weight in grains per yard of card sliver.

This, to my mind, gives the reason why Tom was so exact in the weight of his lap. But, like the writer, he does not know it all, and I think he made the mistake of springing the trap before he made sure that a draft of 140 was possible on all cards. A draft of 139.65 can be secured on a Whitin card. We are running Howard and Bullough cards. An 11 draft gear gives 145.9 draft, and a 12 draft gear gives 133.7 draft. Therefore, I am unable to use 15.3-ounce lap.

Next, let us turn to page 940 of the same issue of COTTON, and on this page we find Contributor No. 3 exclaiming, "And what a sight we beheld! In the first place, they were running an 18-ounce lap." This is a mill experience which points out what deplorable conditions an 18-ounce lap will cause.

My letter which immediately preceded the communication of "Tom" in the October number under the head "More About Card Drafts," will, I think, answer what he says in the other paragraphs of his letter.

"A. B. C. (R. I.)," in this same issue, on page 939, says, "The card draft should be at least 124 inches and over." And "Tom" says, "100 inches, anyway, and to 140 inches, if possible." Why stop at 140 inches, if a long draft is beneficial? Why not 240? Now, what I would like to have "Tom" and "A. B. C." and any others answer is this, what gives this increase of strength between a draft of 90 and 140 *when the cleanest grade of stock is used?* Wash (Conn.)

Setting the Feed Plate and Licker-in.

EDITOR COTTON:

As I read from time to time the different ideas and opinions of the various readers of the "How Other Men Manage" department in regard to the setting of the feed plate and the licker-in, etc., I am prompted to give my views on these two important features of the carding process.

We are all aware of the fact that the object of the licker-in is to disentangle the fibers and deliver them to the cylinder in the proper condition, and also to serve as a cleaning device, as it whips the cotton fibers against the

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mote knives at the nose of the feed plate. The licker-in is moving in a downward direction, and the teeth are pointing in the direction of its course of revolution, and since the fringe of cotton is held by the roll, it will be disentangled as the teeth pass through it.

When the cotton is released from the bite of the feed roll, it will be taken by the teeth of the licker-in. Any short fibers that are not sufficiently long to be grasped by the licker-in, however, will fall through the space between the mote knives, and this is known as fly waste.

The surface speed of the licker-in is about 1,000 feet per minute, and as the licker-in revolves with the cotton, the portions of fibers that are not in contact with the teeth will be thrown out by centrifugal force so that the impurities that project from the fibers on the surface of the licker-in will come in contact with the blades of the mote knives and be removed, dropping below the mote knives into the fly.

The licker-in seldom needs grinding—only when some accident happens to it—and when it is necessary to grind the licker-in, a solid emery or carborundum wheel should be used.

But getting back to the subject, there are quite a number of different opinions as to what gauge we should use in setting the licker-in. That, in my opinion, depends altogether upon the grade of cotton being used and the class of work being produced. We all know that the better grade of cotton used, and the less production put through the cards, the better the class of the work that will be produced.

I believe that with good American cotton, intended for say 30s or 40s yarn, and carding about 800 pounds a week, a No. 7 gauge should be used in setting the licker-in. With Sea Island cotton, carding 250 or 300 pounds a week and producing about a 35 grain sliver, a No. 10 gauge should be used on this setting. I have tried both these settings on both kinds of work and know they work fine.

As to the setting of the feed plate, that also depends upon the class of work and the grade of cotton, and also upon the length of the nose of the feed plate. The important difference between the various feed plates is the distance from the bite of the feed roll to the lower edge of the face of the feed plate. When this distance is regulated in accordance with the length of staple being worked, the entire length of staple is so supported that it receives the full benefit of the cleaning and disentangling action of the licker-in, which will reduce the work on the finer parts of the card.

The distance between the bite of the feed roll and the lower edge of the face of the feed plate should always be from 1/16 to 1/8 inch longer than the average length of the cotton being worked, as it is necessary that the fibers should be free from the bite of the feed roll before the teeth of the licker-in exert their greatest pull, which is at the lower edge of the plate. Otherwise, the fibers will be broken.

I believe that a good setting for good average American cotton, intended for 30s or 40s yarn, would be a No. 10 gauge, or, if the cotton was very trashy and full of leaves and dirt, a No. 7 gauge could be used all right. No damage would occur from either setting.

Of course, it is admitted that each man must be the judge of the grade of cotton he is using, and also that the draft has a great deal of effect on this setting, as ap-

plied to the length of time the cotton will remain in its downward direction. But, no matter what grade of cotton, what draft, or what numbers of yarn were being made, I would never think of pulling my feed plate any further away than a No. 17 gauge, and that setting would be only under extraordinary conditions. I could never think of setting to a No. 22 gauge, as one man has suggested in this Department. I think a No. 17 is bad enough, but a No. 22—as Artemus Ward says, "this is 2 much!"

Ted (N. C.)

A Few Thoughts on Bonus Systems.

EDITOR COTTON:

As we are always interested in the welfare of our operatives, the remarks of "Superintendent (Ga.)" on "How I Would Operate a Cotton Mill," in the July number, proved very interesting and perhaps instructive.

There are some points brought out by his idea which we often overlook, but which should receive our attention if we are to help the other fellow as well as ourselves. The most important, perhaps, is the varied condition which exists in our cotton mills throughout these United States, more especially the class of help in the different sections. This point may be the key to the whole question and explain why one man's idea cannot be successfully carried out in another locality.

The class line to which I refer is drawn very strikingly between the workers in the old New England mills and those in the new southern mills. Our old New England mills have a larger percentage of foreign operatives than English speaking operatives, while the southern mills have a larger proportion of English speaking people. I have stood on the streets of Fall River and watched the help going to and from work and I have stood on the streets of Greenville, S. C., and other southern mill centers and made similar observations, and the two scenes present a radical difference. You can almost imagine you are in Europe when you are in Fall River at certain hours of the day.

I cannot say whether or not "Superintendent's" idea would work out successfully with his people, but I can say that I do not think it a good scheme to apply to foreign labor.

In the first place, if you investigate the thrift of the foreign element you will find that the majority spend very little for board and very little for lodging. You will find that they waste a smaller proportion of their pay on luxuries than any other class of people in the country. In fact, they pinch on everything and then send all the remainder of their pay to their home country, where they receive many times its value in foreign money owing to the condition of foreign exchange. A certain part of these people intend to return to their mother country and live on their savings, while the rest send their money there simply as a speculation. The exchange rate fluctuates daily, so each operative desires to send his money over every week rather than save it here and then send a large amount at the end of the year.

I see no reason why this system, if persisted in, should not stabilize the exchange rate, and that certainly will greatly aid American business. Some of us are skeptical about the value of foreign money, but should we attempt to advise these people we would brush against their faith in their mother country, as well as that trait of human nature which inspires us to "take a chance."

It is my firm belief that these people will save money no matter how little pay you give them and save more proportionately to the increase in pay.

There is another class to contend with in this stockholder idea. This class includes the young men who are all "wised up," the young foreign element that were born in this country, and the independent person who doesn't want any advice. We sometimes think these people waste their money simply because they are always broke, but I do not know as we should consider it waste. With high wages they live better and have luxuries which they have not had before. With hard times they have to cut down to live and they do this just in proportion to the times. There is a doubt whether these people could be made to work at the flood tide of business for small pay with the promise of a bonus next year while all other businesses were paying high wages at present. We had an example of this only a few years ago when the government found it necessary to build cantonment camps. Men left their regular lines of employment to ply a hammer and saw for large pay. These people always look at the present and the future takes care of itself.

There is a very important point in "Superintendent's" idea which may work out universally satisfactorily, and that is the matter of reducing our labor turn-over. The time has come when help is plentiful, but the transient trade does not pay in hiring help. The operative that produces good work and lots of it is the one that has worked in the mill for years, has grown up with it. If a mill will figure out what it costs to break in a new hand, it will be found that they could give a substantial bonus every year to every hand just because he has saved the mill the expense of hiring a new hand. Pay him the prevailing wage and then figure out what his steadiness is worth to the mill and split with him, and I doubt if there will be much labor turn-over if other conditions are correct.

When we try to improve the wage question we are handicapped because we cannot vary far from the prevailing scale without getting into difficulty. Any radical change must be universal.

M. W. H. (Mass.)

Lead—Don't Follow.

EDITOR COTTON:

Elihu Burritt, who became a very learned man after working as a blacksmith almost up to middle age, said, "All that I have accomplished has been and will be by that plodding, patient, persevering process of accretion which builds the ant-heap—particle by particle, thought by thought, fact by fact."

Sir Thomas Buxton, another great man, said, "The longer I live, the more certain I am that the great difference in men, that is between the great and the insignificant, is energy, invincible determination, an honest purpose and then death or victory. This quality will do anything in the world, and no talents, no circumstances, will make a two-legged creature a man without it."

Search all the history you please for reasons for the success of great men and you will find they are all possessed of that one main thought, which I have been trying to point out to readers of this department—"beat the other

fellow."

Too many of us make up our minds we are going to study our work more closely, try to become experts in our chosen profession and then after a few weeks, sometimes only days, of study we give up because it is hard, because we haven't the time, because we are too old or for some other poor excuse. The truth is we are sorely in need of some of the qualities mentioned by Buxton and Burrit.

We must make sacrifices today in order to have pleasures tomorrow. Wisdom will certainly not open her doors to any man who is not willing to pay the price in self sacrifice; hard work.

When you become discouraged in your efforts to learn, if you experience a feeling of disappointment as to the results of your study, should you not ask yourself whether you may not be lacking in any of the characteristics pointed out? And should you find, as you most likely will, that you are deficient in one or more of these qualifications, it is your duty to yourself and to your family to find a remedy for your shortcomings, to cure yourself of your weakness. If you will do this the whole world will begin to look different to you and success will come to crown your efforts.

You know yourself better than anyone else knows you. You know where your weak points are, and to make yourself stronger you must go to work to strengthen these weak points.

Every man has some locked-up forces that are trying their best to break out and make a man of him. It is within everybody's power to call out these hidden forces, to be somebody and do something worth while in the world. Don't be afraid to trust yourself. Have enough faith in your ability to think along original lines. For goodness sake don't follow—*Lead.*

Superintendent (S. C.)

Hendricks' Commercial Register.

In these times of standardization we are always glad to see a publication adopt the size which is becoming the generally accepted standard. The latest convert to come to our notice is "Hendricks' Commercial Register." In its new size 8½ x 11½ inches with a type size 7 x 10 the same size as the pages of COTTON, it presents a greatly improved appearance. The text matter has been opened up leaving a space between the columns making it more readable as well as more attractive and giving ample space for checking and memoranda. The larger page taking more matter naturally requires fewer pages and gives a thinner book which in turn makes it easier to handle. The publishers' statement in the front says that although the increased size of the page takes 25 per cent more matter and would normally reduce the number of pages from 2800 to 2100 enough new matter has been added to make more than 2300 pages. This well reflects the energy of the publishers in the performance of their task of securing new information and keeping the book up-to-date.

Its lists very thoroughly cover the electrical, engineering, machinery, building, manufacturing, chemical and similar industries. We have noted a few changes in the new edition which appear excellent, for example, the subject of "Twist Drills" has been handled in a more comprehensive manner than we have ever noticed in any similar publication and which is new in this edition. The same is true of "Fire Doors," and "Electric Lamp Sockets," and undoubtedly this is true of many other subjects.

For years we have used "Hendricks'" in our work and have found it comprehensive and without "padding," well arranged and thoroughly indexed for instant reference.

Hendricks' Commercial Register of the United States, 30th edition for 1922, 2324 pages, 8½ x 11½ inches in size, may be secured through COTTON'S Book Department or from the publishers, S. E. Hendricks Co., Inc., 75th Ave., New York. Price, $12.50.

JOHN D. JONES has been made local manager of the Buffalo (S. C.) Mills, succeeding R. P. Sweeney.

C. J. DEAL, president of the Corriher Mills Co., Landis, N. C., died on Tuesday, December 6, as a result of heart trouble. Mr. Deal was also secretary of the Linn Mills Company.

WILLIAM T. FINKELL, who has been actively connected with the sale of chemicals to the textile trade for a number of years, died recently. He was a member of the partnership of Finkell & Stearns, handling "F. & S. Peerless Compound" a detergent for the boiling out of cotton. A report of this product states that by its use, it has been made possible to reduce the amount of caustic used in a boil to one per cent or less, improving the extraction and feel of the goods, and eliminating some of the injury to the fiber resulting from a long and concentrated boil in caustic.

H. S. FOWLER has returned to his former position as overseer of carding at the Arkwright Mills, Spartanburg, S. C. For a time he has been superintendent of the Mary Louise Mills, Mayo, S. C. At the Arkwright Mills he succeeds J. W. Brown, who has accepted the position of carding overseer at the Musgrove Mills, Gaffney, S. C.

J. L. COOPER has changed from overseer of carding at the Easley Mill No. 1, Easley, S. C., to a similar position with the Alice Mills of the same place.

W. C. POOL, formerly at the Pacolet Mills, Trough, S. C., has become cloth room overseer at the Arkwright Mills, Spartanburg, S. C.

B. P. ADAMS has resigned as overseer of carding at the Statesville (N. C.) Cotton Mill to become overseer of carding and spinning at the Klumac Manufacturing Co., Salisbury, N. C.

J. O. BROWN has been made superintendent of the Greenville (N. C.) Cotton Mills. He was formerly overseer of carding at the Roanoke Manufacturing Co., Roanoke Rapids, N. C.

ALBERT S. ARNOLD, formerly at Portsmouth, Va., has been engaged as secretary of the Y. M. C. A. and general welfare work at the White Oak and Proximity Mills, Greensboro, N. C.

Manufacturers' Machine Company, 120 Milk Street, Boston, Mass., distributed a calendar for 1922 showing a reproduction of one of their cooling and conditioning machines for textile fabrics.

Hubbard Brothers & Co., cotton merchants, Hanover Square, New York, have issued their annual statistical report of American crop movements, based on reports of The Financial and Commercial Chronicle, the New York Cotton Exchange and the United States Agricultural Bureau.

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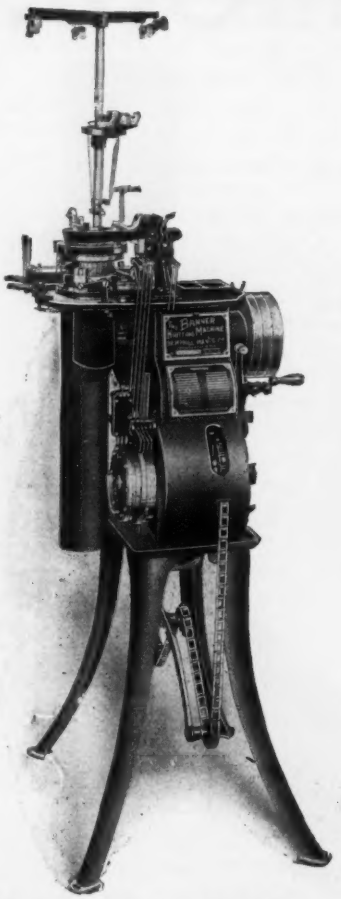

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ALWAYS FIRST WITH THE LATEST

ALWAYS FIRST WITH THE LATEST

Principles of Automatic Hose Machines

BY WILLIAM DAVIS, M. A.

The modern machine for making hose and half-hose fully automatic generally remains something of a riddle to most students of knitting and to many engaged in the trade other than mechanics. The system of different movements required for the production of an article of hosiery are so varied that it requires some perseverance before the chief principles of the mechanism have been grasped. In studying those machines, however, it is clear that in spite of many apparent complexities of construction, the various types have many principles in common and when a survey of the chief types have been made, it becomes possible to grasp the subject in its entirety and place the various constructions under one or other of several headings.

It is a great advantage in studying those machines to keep clearly in mind the chief functions of the machine and then to examine the machine with the object of finding out about these functions and how they are achieved. In all circular knitting machines, it is necessary to produce a knitting action on the needles when one of two things must happen, either the needles and their cylinder revolves and the cam blocks are stationary, or the cylinder and its needles are stationary and the cam blocks revolve; in other words, either the cams move to the needle butts to make them knit, or the needles must move round to the cams to be acted upon by them. Using this elementary distinction, it becomes possible to classify any machine under consideration, because the ascertaining of this elementary principle will bring out many other reductions regarding the nature of the mechanism.

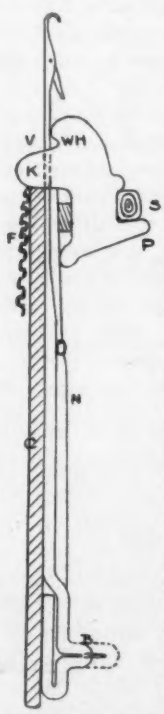

Fig. 1.

In this series it is proposed to take up a few typical examples of this kind of knitting mechanism which has been very sparsely dealt with in technical literature. The first type of machine we will consider is one which may be regarded as belonging in some respects to the pioneer types of automatic hose machines, but it has been consistently brought up-to-date and enjoys a large popularity with a large circle of users in all manufacturing countries. It is made in England and represents the best of its kind as produced in that country and there is a large demand for it on the part of hosiery manufacturers all over the world. The outstanding feature of this machine is that the needles are stationary except for the up and down knitting motion, whilst the cam blocks revolve round the needles.

Needle Arrangement.

Figure 1 will serve to show the method in which the needles and web holders are arranged in this machine. The needle N is of the ordinary latch variety worked up and down in the ordinary manner but the machine was greatly helped in its usefulness by the introduction of what are termed web holders marked W H, also known as sinkers. These serve an extremely useful purpose although the term sinker does not denote the exact function, since the part does not actually sink loops between the needles of the machine similar to what we are accustomed to in the bearded needle frame. The name web-holder is more expressive, for it is more of the nature of a holder of loops than a sinker.

The chief function of the web holder is to keep the distinction between the new yarn and the old loop during stitch formation. In all knitting we have the old loop which is placed down on the stem of the needle and we have the new yarn which is fed into the hook of the needle. In the operation of knitting it is essential to maintain the distinction between those two parts of the loop and to prevent them fouling each other. This is particularly the case when the needles are rising to their starting position after a row of loops has been discharged for unless some control is placed on the needles by means of the web holder, those stitches would in many cases rise with the needles and become mixed up in loop formation.

But the web holders must also be operated so as to let go the new thread when it is time for the stitch to be made and for this reason it must have a motion clear of the needles to let the new thread drop off so as to be drawn through the old loop. The shape of the web holder W H will be evident from the drawing, Fig. 1, where the new yarn is held in the throat of the holder V and above the projection K. The fabric F passes down the inside of the machine, the old loop rests on the top of the cylinder trick C under the projection K. The web holder has a movement to the right and left, the right motion being made so that the new jam will slip off the projection and be drawn through the stitch below. When this is done, the web holder moves once more to the left at the position shown and holds the stitches down on the needle stems as the needles rise to their starting position for a new course. The motion brought about is of a negative kind, a cam makes the holder move to the right and the spring S brings the holder back to the left again when the cam does not act.

The web holders serve another extremely useful purpose and that is they do away with the necessity of picking on the fabric to the needle heads after a press-off of loops has occurred; the operator simply runs the thread into the yarn guide afresh and starts again, for as soon as the first row of stitches slips beneath the web holders, the knitting proceeds as before. This also obviates the necessity of having a heavy tension or drag on the article or hose as it passes down the inside of the machine; were the fabric to be discharged from the needles of the machine without any intervention, as is done on the flat knitting machine for example, some weights would have to be hung at the end of the web or a strongly pulling drag would have to be applied to the fabric beneath to ensure the loops being properly drawn through and discharged.

When the new yarn slips off the projection of the web holder into the fabric below and the holder comes out to the left again as the needles rise, no further tension is required and the fabric is thus able to hang from the needles at a natural tension with the stretching produced by a heavy

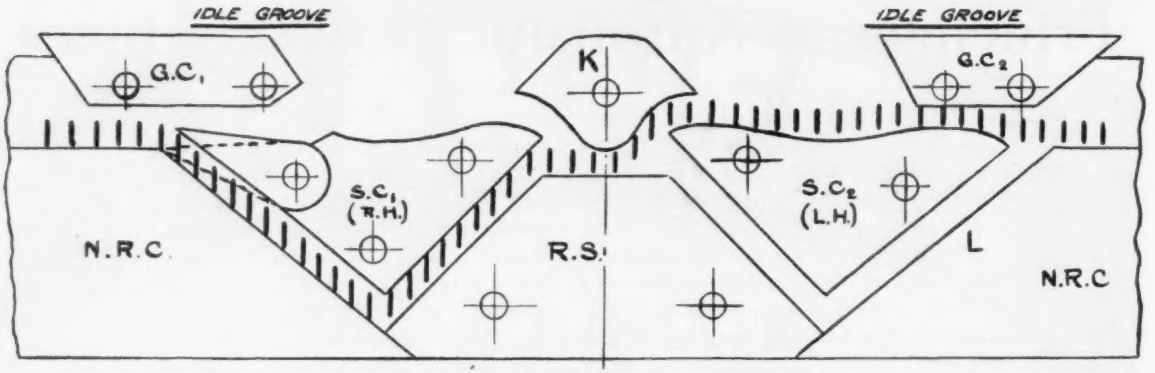

Fig. 2

drag entirely avoided. This has had a very great influence in the quality of the texture and has also enabled the manufacturer to arrange for a more steady production of hosiery exact to length, for when the drag was direct on to the article, it made a proper estimate of the ultimate length of the hosiery rather difficult and many irregularities in length were the outcome of this method. The holders are encircled with a spring S at the point marked and when the cam draws the holders to the right, the spring pulls them inwards to the left again as soon as the cam releases its hold on the part.

The needle butt or heel is indicated by B and it should be explained that most machines of this type have needles of two sizes of butts, a small one and one larger than the other. By this is meant that one type of butt projects just a little farther out of the needle trick than the other, as shown by the dotted butt B. The long butted needles are found in the back half of the cylinder, whilst the shorter butted needles are located in the front half of the cylinder. The reason for this change in butts for the front and back half of the needles is that for making the heel or toe it is necessary to raise the needles on the back half of the cylinder out of reach of the knitting cams as they are not required to knit during the making of the pocket for the heel or toe. When the butts of the back needles are slightly longer, this enables them to be raised into this higher non-knitting position all in a body by a cam which will act on the long butts but will miss the short butted needles.

Formation of Course of Loops.

In studying the method of making a course of knitted loops by this machine, one has to keep constantly in mind that arrangement has to be made for knitting in both directions, the machine turns continuously in one direction to the right in making the leg or the foot, but in making the heel or toe, the machine receives an oscillating or reciprocating side-to-side motion with a concomitant narrowing and widening operation. The machine builder must make arrangement for knitting the fabric when the machine is towards the right and also when it reverses and revolves in the direction of the left. In this way the formation of the cams in the cam box of an automatic hose machine is entirely different to that of a machine for making continuous lengths of web of uniform diameter where the machine always revolves in the same direction—round to the right. Fig. 2 shows the inside of a cam box as used in this machine and which is similar to several other types in the general principles of construction.

Figure 2 illustrates the chief parts in the cam box for ordinary knitting, this being drawn to show the cams moving to the right as in ordinary straightforward knitting. The various cams are marked with the names by which they are generally known in the trade: RS = the raising cam which, as the name indicates, raises the needles into normal position. SC_1 and SC_2 are stitch cams 1 and 2, number 1 being the left-hand stitch cam R H and number 2 the right hand stitch cam L H. On the left of stitch cam SC_1 will be noted a dotted part which is known as the snap cam, it is controlled by a spring in such a way that it has a normal position for ordinary knitting and a dotted position for reverse direction knitting. GC_1 and GC_2 are left and right hand guide or guard cams, whilst the center cam K is fixed on a central block; above the guard cams is shown the idle groove or upper needle position where the butts are out of reach of the knitting cams and are not acted upon by them.

The needle butts are shown passing through the cams in the course of making an ordinary row of loops for plain straight knitting and it will be seen that the cams are moving to the right and the needle butts enter the path of the cams on the right just under the guard cam GC_2. They next pass over the top of stitch cam SC_2 and are caught by the underside of cam K which depresses the needles so that they are caught by the right side of cam SC_1 and taken down to discharge their loops and knit. When they are drawn down to their lowest position, they pass up the right side of needle return cam NRC which raises them once more to their normal position.

The Reversed Action.

All those cams would not be required if knitting had only to proceed in one direction as in a large machine for making plain web. All hosiery making machines are required to make arrangement for knitting the heel and toe, where a pocket of extra material is inserted into the article worked with a shaping movement on the front half of the needles. For this the needles in the back half of the cylinder do not knit and the heel or toe is made entirely on the needles in the front half of the cylinder. To do this the needles must receive a reciprocating or oscillating motion; they are worked from right to left and back again from left to right, and the cams are operated in this manner over the needle butts. How it is actually accomplished may be learned from a further examination of the cam arrangement of Fig. 3, where in place of the cams moving to the right we must consider them reversing their motion to

move towards the left. This being the case the needle butts enter the cams at the left of the diagram and the snap cam is in its normal position, that is closed against the cam groove in such a way that the needle butts are unable to enter and so pass above, as shown.

This is the chief function of a snap cam, the needles which enter the groove from the inside cam force themselves out by lifting the spring, but needle butts cannot enter from the left. The needle butts therefore pass along the top of stitch cam SC_1 and are pushed down by the left side of the central cam K, at which position they catch the left side of the stitch cam SC_2 and are taken down the inside of this cam to knit. It should be pointed out that the shape of stitch cam 1 is a little higher at the right hand side on the top in order to give the needles a little upthrow to receive their thread from the yarn guide. When the needles have been drawn down to their bottom position by the inside of cam SC_2, they are forced up the side of cam NRC or needle return cam to be restored to their normal knitting position on the ordinary ledge of the machine. Thus it will be seen that by this arrangement of cams, with the assistance of the snap cam which lets needles out of the knitting groove but prevents their opening a passage at the left, we are able to provide for complete courses of knitting in either direction of motion such as is required during the making of the heel or the toe of an article of hose.

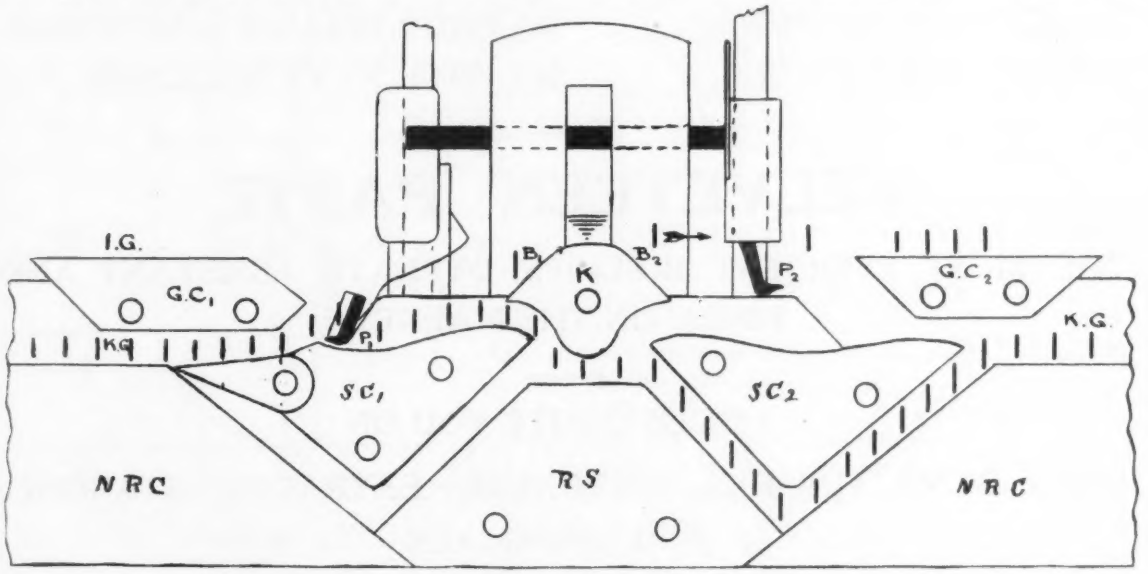

Fig. 3

Making the Heel and Toe.

It will not be necessary in this article to detail the elementary features of the method of making the extra fabric required for the heel and toe, for the system is identical in most machines of this circular class and the heel produced is the same as that of the Griswold hand stocking knitter, the principle of which is understood by most people who have had any experience in knitting. The basis of the heel or the toe, for they are identical in the making, is that you use the front half of the needles only for making this extra pocket, the back half of the needles being meantime put out of action. To facilitate the latter operation two lengths of butts are employed in the needles as already mentioned; long butted needles being placed in the back half of the cylinder so that when the proper signal is given by a link on a chain, a certain cam comes into action and lifts all the long butted needles bodily into a high inoperative position, that is to a level where they will be out of control of the knitting cams.

To fashion the piece for the heel, we require to act on the needles of the front half of the machine cylinder and place the end needle on each side of the swing out of action, one on the right and one on the left at succeeding sweeps of the cams, until only about 12 or 16 are left in work. When this is done, we have to reverse the process and place the needles one by one into work once more at each side until the full complement of needles are again in action. It will be interesting to illustrate the precise method of performing this operation, because the system is very similar for most types of machines of this category.

To understand the principles of narrowing for the heel, we must first consider that there are two grooves in the machine, there is the ordinary knitting level shown in Fig. 2 where before the needle butts enter the knitting cams, the needles are riding in a normal position above the stitch cams and below the level of the central cam K; as long as the needles ride in this position, so long will they be acted upon by the ordinary cams as explained in the operation of stitch formation. For the narrowing process, we have to raise the needles on each side, one by one into a non-knitting position, higher than the path of the needles for ordinary work and this is known as the inoperative position or, in other words, the idle groove. In Fig. 2 the idle groove is so marked just above the guide cams GC_1 and GC_2 and any needles placed above these are out of knitting position and will form no stitches. The problem therefore is to move the needles one by one on each side from the knitting level and place them in the idle groove above.

To perform this operation, we employ two pickers, shown in Fig. 3, one lying on the right and marked P_2 and the other on the left marked P_1. These pickers are simply

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constructed with a small opening at their extremities in the form of a groove which will hold one needle butt and when the picker comes against this butt, the picker and its needle are forced up a small incline behind it so that the needle is raised into a level B_1 and B_2 where the upper curve of the central cam K completes the movement upwards and places the needle in an inoperative position in the idle groove. When the cams are revolving in the direction of the left, picker P_1 catches the end needle butt in its groove and as the picker rises, it takes the needle with it and leaves it at such a height that it will be taken up further on the upper curve of the central cam K, out of knitting action.

Similarly, when the movement is reversed as in the reciprocating motion, picker P_2 comes against the first needle on the right side and by a similar motion raises it to the level where it will be moved by the right hand upper curve of cam K and placed in the idle groove. This takes place at each side alternately until only twelve or sixteen needles remain in work when the narrowing of the heel is complete.

Widening.

To complete the heel, the fashioning process has now to be reversed and the needles placed back into knitting position again by what is known as a depressor cam, shown in Fig. 4. Its mean feature is the T-shaped part shown at D

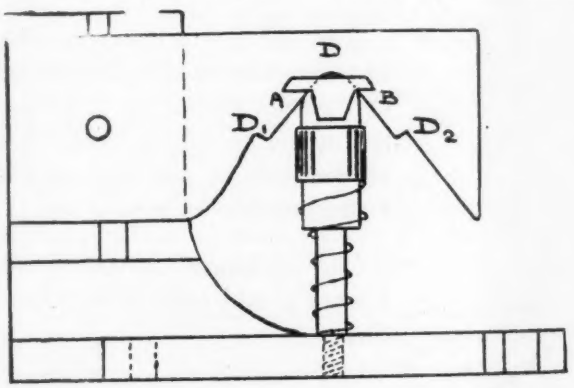


Fig. 4

where at A and B we have the left-hand part and the right-hand part respectively, one side A depresses the needles on one side, whilst the right side B depresses the needles on the other side, so that one depressor suffices to depress the needles on each side when widening the heel.

The action of the depressor is to lie in the path of the needles in the upper or idle groove and one by one to replace them in knitting position in the lower or knitting groove. When a needle is replaced on the right side, the depressor is carried down into the position D_1 and leaves the needles there so that the next course they will knit. Similarly when the needles catch the depressor on the left, it is pushed down into the position D_2 and leaves the needles there in the path of the ordinary knitting cams. In this machine the depressor is made to take down two needles at a time, because when the needles reach the knitting position the ordinary picker P_1 or P_2 is lying in wait and promptly takes one of those two depressed needles and replaces it once more in the idle groove so that there is a net gain of one needle put into work at each side during the widening process which is exactly what is wanted. If the depressor were to take down one needle only the picker would always undo the work of the depressor and throw it back once more into the idle groove so that no shaping would be possible.

Altering the Tensions.

In this machine are two methods of altering the tension of the loops, one of which is merely local, providing tighter loops at the ankle of the hose, and slacker loops at the welt, while the second method refers to a general adjustment of the tensioning devices to give an all-round tightening or slackening of the loops. In altering the tension, the operator can either alter the height of the needle cylinder in relation to the needle butts or the relation of the cams to the needle butts. In hand machines, the usual practice is to alter the height of the cams so that the needle draws a shorter or a longer loop, but in this machine the needle cylinder is raised or lowered to alter the tension. If the needle cylinder is raised, then the loops are shorter, because the cams do not pull the loops down to such an extent. If the cylinder is lowered, the cams have greater purchase on the needles drawing them farther down to give longer loops. In this machine the height of the needle cylinder is altered from two sources, first there is a graduated wheel where graduated heights of its circumference exactly correspond to the height of the cylinder; second, there is a tension screw which, when turned in one direction raises the cylinder, and turned in the opposite direction lowers it.

[This is the first of a series of articles on knitting mechanism. The second will appear in an early issue.]

Knitting Mill Notes.

An addition is being constructed by the Tamaqua (Pa.) Underwear Company.

The Jersey Textile Corp., Newton, N. J., manufacturers of silk jersey cloth, has plans under way for the rebuilding of its plant, destroyed by fire on November 14. H. B. Lowenstein is manager.

A three-story addition will be built by the Atlantic Knitting Mills, Inc., to its plant in Lynbrook, N. Y., at a cost of about $150,000.

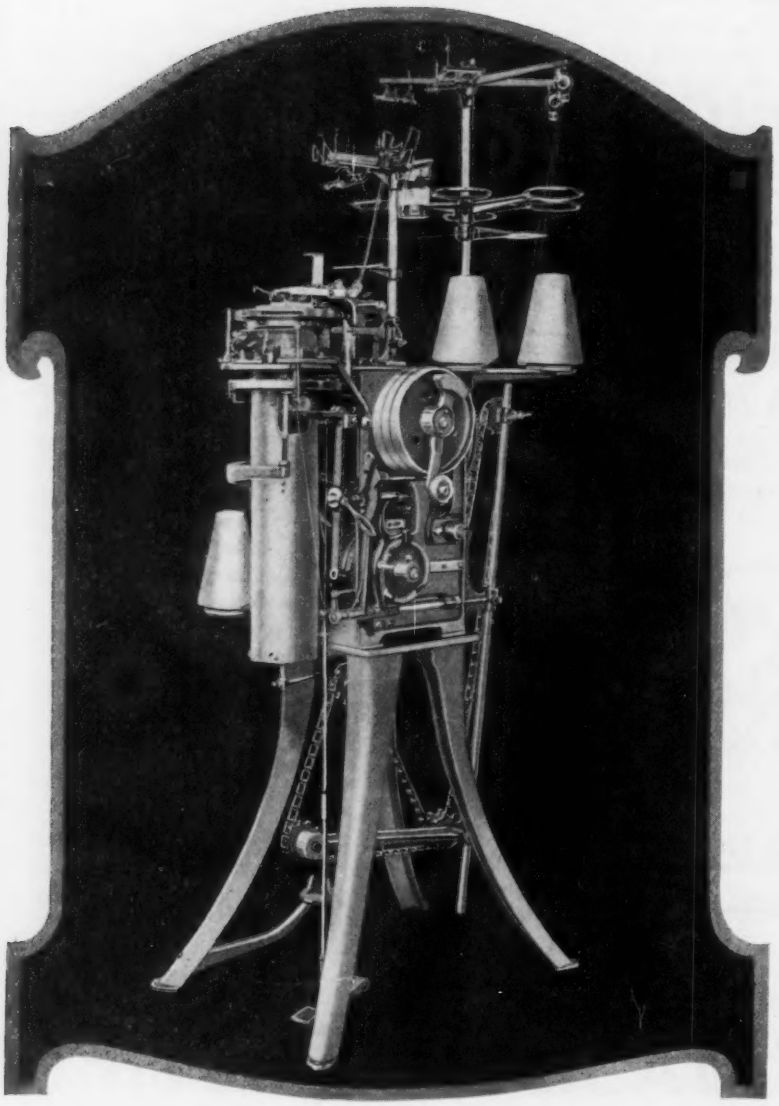
The Chapman Knitting Mill, Yonkers, N. Y., has plans for the construction of a one-story top addition to its three story plant, the work also to include a number of alterations and improvements in the present factory.

Fire recently damaged a portion of the plant of the Ortess Knitting Mills, 37-39 West Twenty-Fourth Street, New York, N. Y., including machinery and stock.

The Nicholas Underwear Co., Bridgeport, Conn., has awarded a contract to the T. J. Pardy Construction Co., Bridgeport, for the erection of a new two-story mill, 50 x 90 feet, on Benham Avenue, estimated to cost about $13,000.

The Princeton Knitting Mills, Brooklyn, N. Y., have leased an entire floor in the Robert Gair Building, Washington and Front Streets, for a local plant.

E. A. Phillips and J. Schwab, associated, Philadelphia, Pa., manufacturers of knit goods products, have leased the fifth floor of the building at 1427-33 Vine Street, for a local establishment.



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The Knit Goods Market

Looking at the knit goods market situation through the window of the mill office, it is an improvement over the end of 1920. In point of volume of movement of goods, it compares about fifty-fifty. The outlook for 1922 is better than it was a year ago for 1921. But at this writing the trade at large seems prepared to witness during January the depths of the depression which set in along in November. The year did not have a good start in the matter of collections and there were prospects that a considerable number of accounts may be held under consideration until financial statements as of January 1st have been submitted. November and December were a forerunner of the financial upsets which it was expected would occur in January. There have been and will be a lot of small failures, which should be viewed as commercial purgatives. By February the body commercial will have been cleaned of impurities in the way of bad and doubtful accounts, so that the factors tending toward depression may be regarded as in a way constructive, a means for putting business in a more healthy state with the revival that at the outset of the year seemed assured.

The year starts better than did 1921 for one reason in particular—dealers quitted the old year with practically no stocks. All interests agree that bins and shelves are bare of knitted goods. It was the belief that inventories had been reduced to the lowest showing of merchandise holdings in the recollection of the older jobbing houses, and that few years dawned on smaller contingent liabilities to hamper the average distributor.

The year starts better for the mill, too, because of the fact that a lot of goods for spring was bought last year and factories are assured steady operation for a time in the completion of orders. A year ago almost every distributor had stocks and mills were waiting for orders, as some now are.

The year starts better for the jobber because he already has sold against initial orders for spring and even now is in position to place repeats, and prices are more nearly stabilized than at the corresponding period of a twelve-month ago. The retailer had a profitable holiday trade and, barring an element which sells to the consumer and has been planning to liquidate at the expense of creditors, will have plain sailing with new goods at the lowest prices at which it has been possible to buy in many months. Retailers as a body did not have a bumper volume of holiday business, but they managed to get prices that yielded princely margins. What was lost in sales surely was made up in profits.

Among jobbers there is a better show of confidence than a year ago, as indicated in the contracting for underwear for the winter of 1922-23 and for wool hosiery for the same season. Practically none was sold a year ago for the current season. Jobber attitude toward the mill is more satisfactory than it has been, and some are recommending that there be no unnecessary deferring of commitments. The buyer for a leading establishment makes the unqualified statement: "It is a bad policy on the part of distributors to force curtailment of production."

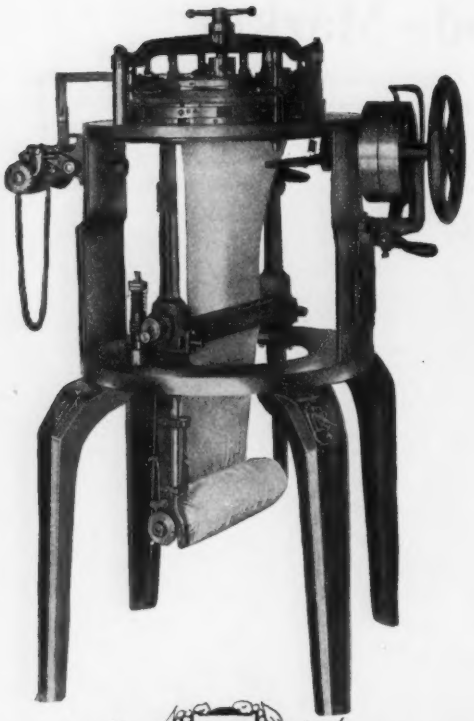
This is a sentiment that cannot be too strongly emphasized or too widely circulated. Curtailment was forced throughout the year just ended, disorganizing work forces and demoralizing values. Scarce a mill executive could plan a manufacturing campaign. Overhead was kept at the top while prices were being screwed down, until buyers became suspicious of sellers and sellers suspicious of one another. Jobbers have talked of the desirability of closer cooperation with manufacturers. Just now there is abundant opportunity for making a show of sincerity. Jobbers who force curtailment at the mill serve no good purpose for themselves, the manufacturers or the retailers, and the high cost of curtailment is paid by the consumer.

Of some hosiery lines there should be curtailment, which does not mean that there need be less employment of mill help. Hosiery has got to be adapted to 1922 needs. There should be less of the commonplace and still more substitutions, of which last year there was a flood. For example, a mill in North Carolina found the market draggy for its line of mercerized half hose with cotton tops and soles, etc. It was intended to be a 25-cent retail sock. At the price the mill was asking, jobbers would not buy, contending there was not sufficient spread between mill and consumer. So the management of this mill made a change in the yarn content whereby it became possible to reduce the price by 10 cents a dozen. A sample of the stocking made in the new way, with less mercerized yarn and more carded, was shown a commission house, and a contract for 1000 dozens a week for the entire year was at once entered into, and that about takes all that the mill can turn out. Activity can be made to supplant inactivity by adaptation.

The bringing out of 176 needle hosiery for men and women in heather effect proved a boon to a number of mills which had been turning out what now is, to a great extent, the effete sulphur black and the direct black. Carded heathers brought good prices. There is the possibility there will be too many of them this year, unless manufacturers engaged with low end lines go further into the field of innovations. Cheap heathers can be overdone, as were the automatic top socks, which, however, still fill a niche in the market, but the niche is becoming narrower.

There are staples that will continue to be staples, as were the cut nails in hardware stores a generation or two ago, and which have given way to nails of wire, a better product for the purposes for which nails are designed. It is no far guess that the cheap ribbed stocking for children as it has been marketed for years will be worn in diminishing quantity. It laid the foundation for more than one manufacturer's fortune and it has been the ruin of others, for there has been too many of it. Production of such lines can be legitimately and profitably curtailed and increased in others. Short lengths with the rolled top have proved the undoing of the one-time staples, but severe winters might reverse the demand situation in a twinkling. At this stage the manufacture of hosiery is a gamble, involving a degree of hazard that calls for more substantial profits than most mills were able to compute in the last two years.

Wool heathers and silk and wool in combination appear to have come to remain, for a few years at least. It is believed they by no means reached their height last year. They proved the salvation of more than one mill whose management foresaw the swing that was coming or could be forced. No mill got off a year's production, as buying for the current season did not start until late. There will



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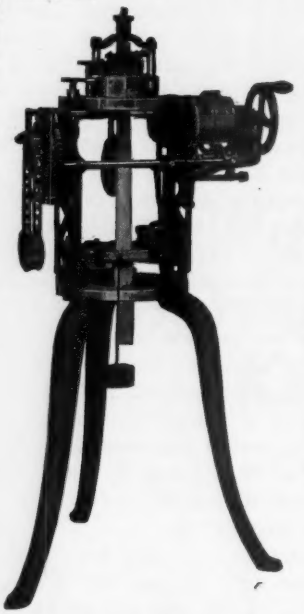

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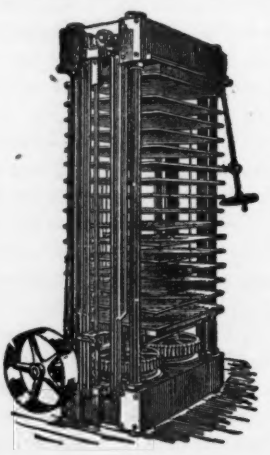

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be more of them for next fall and winter, for operations began with the coming of the year. Several mills sold heavily in December. Jobbers showed deep interest in early showings, and it is believed the pick of the heathers has been sold up. At least one mill found it expedient several weeks ago to restrict its commitments to jobbers, a number of whom had to submit to a scaling of their orders while the prospective production was being allotted. Meanwhile one of the large mills specializing in high grade heathers had not opened its lines, preferring that its customers wait until January to place their initial orders. For one reason, there was some doubt as to available wool and the price, the situation as to wool being affected by the schedule of duties in the emergency tariff bill which, according to some interests, is the equivalent of a practical embargo. At present writing it looks as though wool prices would be maintained, with an upward rather than a downward tendency.

Wool hosiery, while for the time drawing attention from silks, undoubtedly has paved the way for a bumper year in the latter. Wool hosiery and their wearing adjunct, low shoes, served to perpetuate the short skirt, and short skirts mean silk stockings, and it is a safe prediction that these will be more generally worn during the spring and summer than last year. But even with the fashion markings, the seamless are going to have harder sledding than ever in holding their own against the full fashioned. Production of the latter this year will be very much larger than in 1921, when, by reason of strikes, there was a full nine months loss of production in sixteen mills. All of these have gotten fairly started under the open shop plan since last September and should be turning off their full quota. Then there was installed during the year probably 500 full fashioned machines, each with a normal output of 10 dozens a day when operated say 54 hours a week by skilled operatives. Necessarily some of the full fashioned machines have supplanted the seamless. In the absence of trustworthy production reports from manufacturers, this year's increase in the output of full fashioned and the decrease in seamless cannot be approximated, but, estimating 300 working days to the year, 1922 should produce all of 1,500,000 more dozen pairs of full fashioned than were turned out in 1921.

Judging from the experience of manufacturers, there should be no increase in the production of artificial silk hosiery, but it seems pretty well assured that tram and artificial silk will be used in combination to a greater extent than last year, unless the control of the Japanese silk combination for boosting and maintaining prices be broken. The high price of silk should work toward restricted production of silk hosiery. Manufacturers as a class are afraid of silk at current quotations and will not be disposed to buy heavily for future; nor will they be inclined to sell far ahead while there is a possibility of a sharp decline in the raw silk market. Jobbers will be as wary as manufacturers and the present outlook is for very cautious operating. Such mills as the Berkshire and the Nolde & Horst, both in Reading, Pa., have sold up to June 30 of full fashioned silk hosiery, and jobbers evidently bought well, with no fear that prices will go under the figures at which they made their commitments. Mills which have yet to sell their next six months' production will have less easy sailing. There will be demand, but there always will be the fear of a reaction.

Favoring the manufacturer is the fact that there is comparatively little silk hosiery in the hands of dealers. Those who have not bought their requirements for the first half of the year will be forced into the market, if for no other reason, because a number of the stronger houses have contracted at prices on low-cost raw silk.

While last fall there was some buying of hosiery for the next three to six months, the bulk of what will go over the retail counter between May and September remains to be contracted for, and there should be considerable activity in hosiery as a class of knitted goods beginning with the disappearance of the post-holiday quiet, which seems likely to run into the last days of the month, perhaps into February. Much will depend on the course of cotton. The effect of the December 12 report of approximately a million more bales than originally was figured by government statisticians cannot be arrived at. In the first place, possibly nothing could have happened that might have stimulated interest in cotton hosiery, for dealers were bent on reducing their inventories—going into the new year with no stocks. Again, cotton recovered from the shock so speedily that the result in the primary cotton goods market was wholesome rather than otherwise. It can be said that so far as production and sales were concerned, probably not a hosiery mill was affected by the surprise precipitated by the cotton report and what occurred in the cotton market in sequence.

It is estimated that Pennsylvania hosiery mills—those engaged mostly on cotton goods—are operating, as a whole, on the basis of about 50 to 60 per cent of capacity. Some are idle, some operating part time. Some few Philadelphia mills last month laid off a part of the help. A few added, giving instant employment to operatives who had been put into the ranks of the idle. A mill making infants' ribbed socks had sold to March and seize the opportunity for employing an additional shift. There was a demand which assured steady operation with two shifts until May. This mill formerly manufactured misses' combed and mercerized ribs. Finding the lines were not movable at current prices, the manufacturer abandoned the lines and turned to infants' ribs, with the result demand outran capacity.

Shifting from inactive lines served this mill as well as it did one which brought out something different in silk half hose about the time silk socks were not promising well for mills generally. The innovation is of slightly heavier silk than the commonplace sock and differs in a respect which the mill executive does not disclose. His first showing of samples netted the manufacturer a sale of 5,000 dozens, at a price better than the average silk sock at the time.

W. B. Davis & Son, Fort Payne, Ala., have had remarkable success with their line of split sole silk half hose, which have been sold well ahead by Charles Chipman's Sons Company, New York, selling agents for the mill. The line was put on the market quietly, but soon caused excitement in the trade. The Chipman house has had a good run on its Rosedale mill line of full fashioned silk half hose.

It appears that silk half hose is displacing mercerized and plated socks to an extent that is not appreciated in a great part of the trade. Men in the every-day walks of life who looked on silk socks as intended to be worn only

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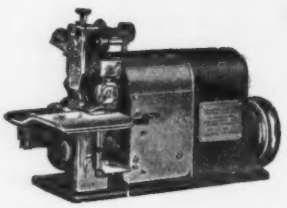

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with low shoes now use them throughout the year. This is apparent to observers and is attested by retail dealers. With the production of silk hosiery steadily increasing and that of cotton stockings apparently diminishing, it seems not unlikely that the manufacture of the latter will be, largely, in the hands of mills with facilities for volume of output at the lowest prices obtainable through minimum of overhead and economy in operating.

Underwear is working into a fairly strong position for 1922. Most of the mills had yet to name prices while a few were selling for the winter of 1922-23. Three of the southern mills making cotton ribbed suits and single garments began selling in the early part of December, and at least two are understood to have booked considerable business. At the outstart prices for the second quarter were 25 cents a dozen higher than for the first and another quarter higher for the third. Some jobbers took advantage of the bottom figure and contracted for deliveries in January, February and March.

A Central West mill making high grade numbers of union suits has enormous bookings of winter underwear business, some of its customers more than doubling their initial orders of a year ago. This mill went out early, taking the same stand as did the three southern mills, that the time to sell is when buyers are ready to operate. It is stated that not a few desirable jobbing houses came into the market early, holding to the belief that the opening prices would be the lowest for the season. These jobbers are of the mind of the buyer who said in an interview that it is a wrong policy for distributors to force curtailment of production. He said:

"I believe that winter underwear which now is being sold was priced on the basis of cotton at the lowest price since the summer rise, and that no declines should be looked for, in any event, not before next August to September. It is probable," he continued, "that present prices for early deliveries are the lowest that will be had during the heavy weight underwear selling season. There is the possibility that a larger cotton acreage than now seems contemplated might precipitate a break from present levels," but, the buyer said, "I cannot conceive of such a decline as would materially affect values of merchandise contracted for now.

"It is desirable that mills be kept going," the buyer continued; "it will be better for all of us if they can be, and it is my thought that jobbers, regardless of their distribution in 1922 or in previous years, ought to buy about 50 per cent of their estimated requirements for the year. By August they would be in position to gauge their needs for the remainder of the year. If prices advance, the advantage of early purchases obviously will be in the buyers' favor; if they decline, we simply would have to average down, and I am satisfied that could be done without any serious impairment of normal profits."

Roughly speaking, three months production of heavy weight underwear was lost in 1921 because jobbers did not commence buying until along in March and manufacturers in the main were wisely reluctant to accumulate stocks in anticipation of distributors' purchases. Jobbers had a carryover, and hundreds of thousands of shirts and drawers were re-exported into the United States, by French, Belgium and American speculators. They had bought for a mere song millions of dollars worth of war textiles from the French government, to whom the goods were sacrificed by the United States government some time after the armistice. An indulgent Administration permitted these goods to be sent back to the United States, with the Underwood low duty paid on the foreign valuation indicated by invoices. In consequence this country was flooded with war underwear in the very height of the selling season. Yet with all of this and the carry over from 1920, dealers in the cold northwest sections were bare of goods at times during periods of low temperatures and were begging for at once deliveries. It is apparent there are no stocks to be carried into next winter, and that more underwear will have to be made in 1922 than was produced in 1921. This looks like a big underwear year, particularly for jobbers who started in early on their winter shopping.

The P. H. Hanes Knitting Co., Winston-Salem, N. C., was among the larger mills taking no part in the early opening. This mill was one of the few which last year took a chance on the market and operated while jobbers were sleeping. In this instance this ordinarily hazardous procedure worked to the advantage of the mill, for the company sold its production, and in four months had a larger volume of business than for the corresponding period of any previous year. The P. H. Hanes Company enjoyed some advantage in selling under its own brands, which had been well established in the trade.

While there are jobbers who insist the trade should anticipate at least 50 per cent of its underwear requirements, there are many who will refuse to take any part of the risk, leaving it to manufacturers to carry stock for them. The explanation of jobbers in this class is that they must carry stock for the retailer. If this be true it is because the jobber has been unduly indulging the retailer, for it is noted that mills selling direct to the retail trade do not carry their customers; that there is an amicable 50-50 division of the risk, the dealers buying in season without obtaining any such protection as jobbers say their customers require. How a dealer who steadfastly refuses to assume any part of the hazard of buying for prospective requirements can look for a manufacturer to shoulder all of it is not quite clear. If mills operated as hold-back jobbers do, a cold winter would find a large part of the population shivering for want of underwear.

Fleeced underwear for the winter of 1922-23 was opened by the High Rock Knitting Co., Philmont, N. Y., in the early part of December, other manufacturers of fleeces deferring the naming of prices, fearing an opening before the first of the year might prove premature. It is pointed out that twice in the last two years premature openings had a demoralizing influence. Jobbers held off and in the confusion that followed among easily scared manufacturers there were disturbing price breaks. Many distributors seem to overlook the fact that what disturbs the market for the manufacturer demoralizes it also for the jobber.

The situation as to spring underwear is fairly satisfactory. A number of jobbers have sold their initial orders and have been back with repeats. Others admit they will be placing duplicate orders right along. Their sales appear to have exceeded their expectations. Pacific Coast jobbers are among those who have had encouraging spring business, and these too have been partial to early commitments for next winter. There have been slight advances in the prices of spring underwear since the opening, and there appears no likelihood that there can be any recessions from present

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levels.

Light weight underwear manufacturers will profit by the mild winter and the tendency toward the wearing of summer garments the year round, heavy weights being affected conversely. Unseasonably high temperatures have materially increased the sales of nainsook garments of the athletic type, and with these garments still going over the counter it is expected there will be considerable additions to the bookings for spring deliveries. Manufacturers of knitted light weights have talked of a publicity campaign for promoting the sales of their product, but that is as far as they have gone, and in the meantime the nainsooks have been making still further inroads on the knitted, in face of the theory that the latter, all things considered, more nearly conforms to American ideals as to fabric from the viewpoint of comfort.

The opening of sweater coats for next winter, staged for the middle of November last, proved disappointing. Not a half of the manufacturers showed samples and comparatively few jobbers were interested in those that did come out. Even as late as the latter part of December few sweaters for next winter had been bought, despite the fact that the cotton and wool situation seemed to favor early commitments. Road salesmen met with discouragement everywhere. The best that most of them could report was that buyers were promising to be in the market in January.

Among the sweater exceptions are cheap lines of cotton garments, of which at least one mill has sold probably one-half the year's output. Some interest in sports' garments is shown, but it was apparent that buyers were awaiting a more complete showing of lines. A few mills making cardigan jackets are idle, waiting to hear from the jobbing trade.

Sweaters, usually, are either very stagnant or very brisk. They have had their dull period for the present selling season and much activity may be looked for doing the first three months of the year, when mills will be rushed with spring and summer business.

The experiences of several knit goods manufacturers in the last month or two, while jobbers were buying to cover sales made, should be sufficient to warn against the acceptance of orders for "at once" delivery, except there be a distinct understanding. Two mills in particular can be mentioned as having been drawn into controversies by attempts of jobbers to evade their responsibility under "at once" delivery orders. Unless a manufacturer is prepared to ship immediately from stock he had better send the "at once" delivery back to the buyer or get his precise construction of the term.

A jobber in the southwest bought for at once delivery. The mill advised him it would do its best and try to have the goods go forward within 30 days. Almost 60 days elapsed before shipment was made. Meanwhile nothing had been heard from the jobber and it was assumed the order was regarded by him as in effect and good standing. The goods reached the jobber early in December, and were rejected on the ground of late delivery. Up to that time he had not complained. The mill will test his right to refuse payment for goods delivered.

In another instance goods ordered for at once delivery went out within 30 days and were rejected on the ground the order had not been complied with. In this case the value of the merchandise was so small that the manufacturer accepted return rather than incur the expense of resisting rejection.

A jobber in Texas received two cases of silk hosiery in the early part of December. They were 30 days late and he declined to pay the invoice price, asserting the goods reached destination too late to be available for the holiday trade. With silk stockings as staple as sirloin steak in a meat store it would have been no hardship for the jobber to carry the goods on inventory for 1922.

From the buyer's viewpoint "at once" delivery loses its elasticity as a trade term in a dull or declining market, but has no limitations in a rising market. Abuse of the term is likely to become quite common while jobbers are buying from hand-to-mouth, unless manufacturers take the precaution to fasten buyers down to their exact interpretation of the term.

The Yarn Market.

No radical developments, a continued absence of any trading of note, less offerings of yarns and a slight drop in prices—this about tells the story of the general average condition of the Philadelphia yarn market for the past month.

While there was some buying, the total for the period was not above the prevailing volume for several months back. Throughout the month, spinners seemed firm in their attitude to hold their goods for prices which according to their figures would at least show a profit to them, and they were becoming more and more inclined to not make price concessions merely for the sake of getting the order. The resistance made by raw cotton to the several bearish influences which developed during the month re-inforced them in this attitude, and some mills were reported as preferring to curtail production rather than dispose of goods at less than cost.

Along this line, there is developing in manufacturing circles an effort, caused probably by existing conditions of a cost-minus selling price, to tighten up at every possible point and reduce manufacturing costs to a minimum, pruning every unnecessary expense and eliminating every outlet of finances possible and compatible with holding the product to standard. In a number of cases, probably, this will result in establishing some medium through which the mill can readily ascertain the actual production cost; the advantage to be secured through such an action is obvious. This has already been accomplished in some instances, which has contributed to the stand taken by the sellers in regard to letting yarns go at prices below their cost as determined.

The buyers, on the other end of the line, of course desired to enter the new year with as small inventories as possible, and this combined with the sellers' attitude to cause a session of dullness from a trading standpoint. Another thing: the knitters for example, are disinclined to make any extensive purchases, because, as expressed by one knitter, "if we put our prices up to a point that would net us a profit at present yarn prices, we would not be able to sell our goods at all." They are not holding off because they feel yarns are going down, for, as in the opinion of the knitter in question, "it would be a good thing for us if we could take on some of the cheaper yarns, as I believe yarn prices will be higher in the spring."

However, he says, under present conditions, uncertain as they are, yarn consumers are not justified in covering far ahead, with the whole trade moving from day to day, so to speak.

As to prices, there was a dropping off ranging from a half a cent to a dime over the period from November 19 to December 16. An analysis of the price list on these two dates shows that during the intervening period—

Southern single skeins, 10s, held their own at 29 cents; 16s went from 31½ cents to 31 cents; and 30s from 38 to 35 cents.

In southern single warps, two cents was lost by 10s, which fell from 31½ to 29½ cents, with 40s going from 53 to 52 cents.

One cent was lost by 8s and 9s 3-4 slack, carpet and upholstery yarn in skeins, the price on the latter date being 27 cents.

Southern two-ply skeins, 10s, dropped from 30 to 29 cents and 30s in the group fell two and a half cents to a price of 35½ cents.

In southern two-ply warps, 12s managed to hold at 31½ cents, with 30s falling one cent from a price of 37 cents a pound on the November date.

The largest precipitation was encountered by southern two-ply combed peeler skeins and warps, 8s going from 60 to 52 cents, and the losses increasing as the numbers got larger, 80s losing 10 cents and selling at $1.35 on the December date.

Southern frame spun carded yarn on cones, 10s dropped a cent and a half, going to 29½ cents, 20s went to 32½ cents from 34 cents, and 40s dropped a nickel down to 50 cents a pound.

In the northern section, mule spun carded yarns on cones averaged about a cent loss, 10s falling from 35 to 34 cents, 24s going from 43 to 41 cents, and 60s falling to 58, a drop of two cents. Mule spun combed peeler yarns in this section underwent a drop ranging from four cents on 10s—dropping to 46 cents—to five cents on 40s, for which 76 cents was bid on the latter mentioned date.

The complete list of quotations on the Philadelphia market for December 16 follows:

Southern Single Skeins.

4s to 8s	28	10s	29
12s	30	14s	30½
16s	31	20s	32½
24s	33 @33½	26s	34 @34½
30s	35 @35½		

Southern Single Warps.

8s	29	10s	29½
12s	30½	14s	31
16s	32	20s	33
26s	35	30s	36
40s	52 @54		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	27
8-2-4 tinged tubes	22½
8-3-4 hard white warp-twist	26½
8-3-4 hard twist waste	22½

Southern Two-Ply Skeins.

8s	28½	10s	29
12s	30	14s	30½
16s	31	20s	32½
24s	33½	26s	34½
30s	35½	40s	50 @53

Southern Two-Ply Warps.

8s	29½	10s	30½
12s	31½	14s	32½
16s	33	20s	33½
24s	34½	26s	35½
30s	36 @37	40s	53 @55

Southern Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	52	20s	53
24s	55	30s	60
40s	75	50s	85
60s	$1.00	70s	$1.20
80s	$1.35		

Southern Frame Spun Carded Yarn on Cones.

8s	28½ @29	10s	29½
12s	30	14s	30½
16s	31½	18s	32
20s	32½	22s	33
24s	34	26s	35
30s	35 @36	40s	50 @53
30s double carded			44½
30s tying-in			34½

Northern Mule Spun Carded Yarn Cones.

10s	34	12s	35
14s	36	16s	37
18s	38	20s	39
24s	41	26s	44
30s	46	40s	58 @66

Northern Mule Spun Combed Peeler Yarn on Cones.

10s	46	12s	47
14s	48	16s	49
18s	50	20s	51
22s	53	26s	60
28s	62	30s	65
36s	73	38s	74
40s	76		

Among the Knitting Mills.

The Star Hosiery Mill, of Spartanburg, S. C., has been purchased by the A. B. Victorious Company, New York, which operates a chain of hosiery mills in the South. The mill will continue operation under its present name. The manager will be J. C. Lloyd, formerly secretary of the company.

The Spa Knitting Co., Inc., Ballston Spa, N. Y., has established a branch plant at Chatham, N. Y. The goods will be manufactured and cut up at the Ballston Spa plant and shipped to Chatham where they will be made up into sport coats and bathing suits. Alexander McEvoy, formerly superintendent of the Columbia Mesh Knitting Co., Philmont, N. Y., is manager of this new plant.

Harkins-Hammack-Whitlock Co., Hendersonville, N. C., have ordered architects to prepare plans and specifications for the erection of a building to be equipped for manufacturing hosiery.

The Penn-Victor Hosiery Mills, Reading, Pa., has been organized for the manufacture of women's hosiery. Irvin Binkley and Son are the proprietors. The equipment comprises five 220-needle latch needle machines, one looper and one welter. The company buys 26s single cotton yarn.

Sixty new knitting machines, for the manufacture of silk half hose, have been installed at the Fort Payne (Ala.) plant of W. B. Davis & Son. Heretofore this concern has manufactured only cotton hosiery for women and children.

The Forsyth Hosiery Mills, Inc., recently reorganized, Forsyth, Ga., have started operations on women's 240-needle hosiery. Additional new machinery is planned, and the company also contemplates adding several new styles to the lines of manufacture.

The Erlanger Underwear Manufacturing Co., of Baltimore, Md., has started construction work on a one-story plant at Crisfield, Md., to be 40 by 120 feet, and estimated to cost about $25,000.

The Norristown (Pa.) Hosiery Company is installing twenty full fashioned knitting machines at their plant in Lansdale, Pa., for the manufacture of high grade hosiery.

The Rodges Hosiery Co., manufacturers of seamless and full-fashioned hosiery will erect a mill building at Wyoming Avenue, Philadelphia, which will cost around $29,000.

Hopedale Manufacturing Company, Milford, Mass., is sending out a useful diary book for the year 1922. This is of a size convenient for the pocket, and contains useful information in regard to postal regulations, etc.

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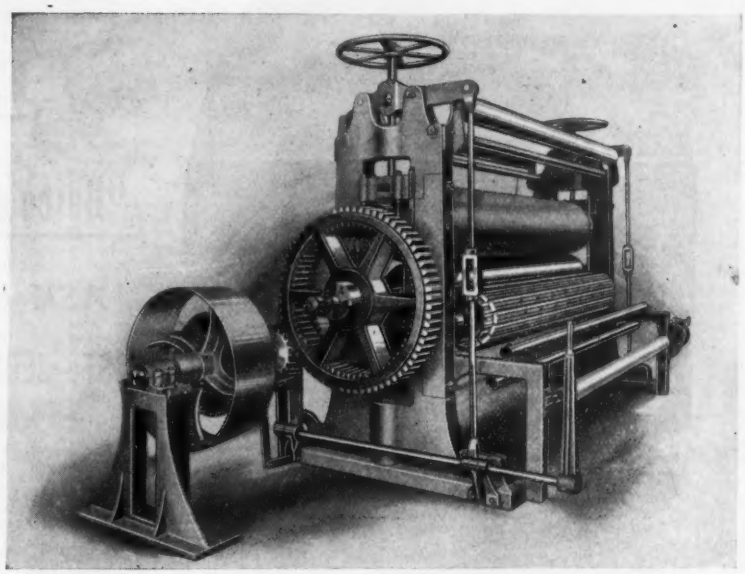

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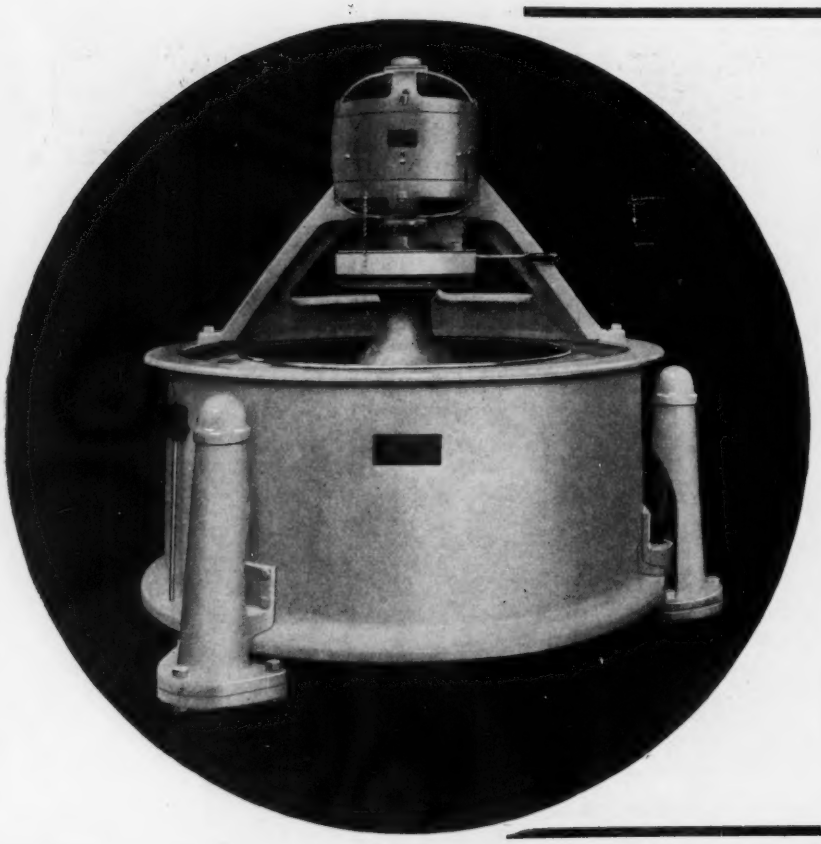

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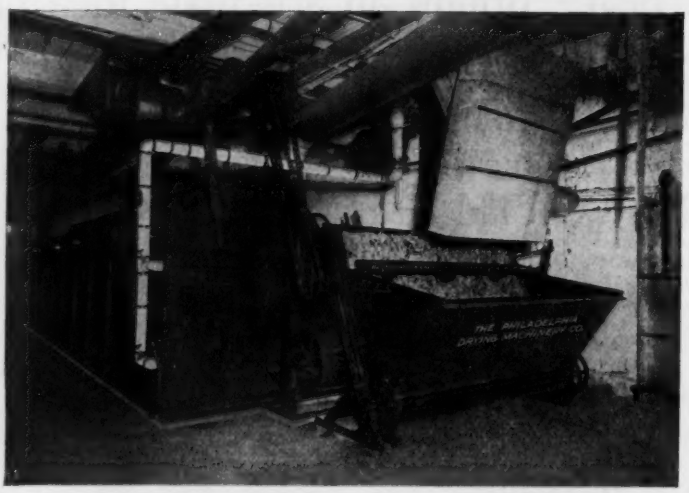

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For Real Drying Efficiency

This machine uniformly and quickly dries all grades of raw stock, preserving the full, natural strength of the fibre. The dried material is fine in appearance and feel.

Accurate temperature control prevents all danger of scorching or overdrying. As the stock enters the machine in a wet condition hot currents of air are circulated through it, and as the percentage of moisture decreases the temperature is reduced accordingly. When it comes out of the machine it is in an excellent, cool condition.

Minimum steam and power is consumed, and labor cost is small, the process being entirely automatic.

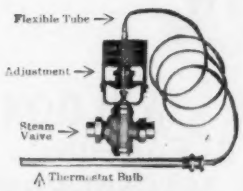
Send for Catalog SD-3

The Philadelphia Drying Machinery Company

Southern Representative:
G. G. Slaughter Machinery Company
Greenville, S. C.

3351 Stokley Street
Philadelphia, Pa.

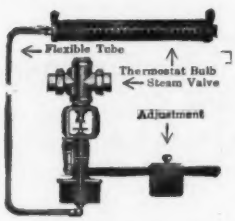
New England Agent:
Hurricane Engineering Co.
53 State St., Boston, Mass.



The Powers Regulator No. 11

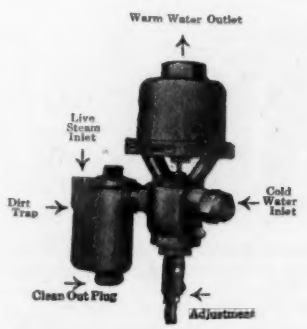
Specially adapted for the control of liquid temperatures as in size boxes, washing machines, hot water tanks, dye kettles, etc. Entirely automatic and self-contained, requiring no outside power for operation. Send for Bulletin 129.

Other designs for other uses, wherever heat control is desirable.



The Powers Regulator No. 15

This Regulator is designed for the control of air temperature in drying rooms of all kinds. Prevents use of more heat than is required, thus eliminating burning of cloth. Easily installed. Entirely automatic, reliable and accurate. Ask for bulletin 138.



Instantaneous Water Heater.

The Steam and Water Mixer is an instantaneous Water Heater, thermostatically controlled against overheating of water. Mixes live steam and cold water. Adapted to wash sinks, shower baths, etc., in textile plants. The most economical installation for applying hot water. Ask for Bulletin 137.

Why the Textile Industry Needs *POWERS* Automatic Thermostatic Regulators

The scientifically correct temperature control that results from the installation of Powers Thermostatic Regulators is advantageous in many ways.

By limiting the heat to the precise degree required, it saves steam.

A constant temperature in the dye bath, such as a Powers Regulator assures, prevents streaked places; eliminates seconds or sub-standard goods.

In scouring, automatic regulation of temperature positively prevents discolored, harsh, or tender goods. The same is true in rinsing and washing.

Automatic heat control prevents tearing when drying in the piece.

In sizing, even weight and strength are assured by Powers Regulators, while boiling in the size box will never occur. Broken ends and chafing are largely eliminated.

Let us prove these facts in your own plant, at our risk.

THE POWERS REGULATOR CO

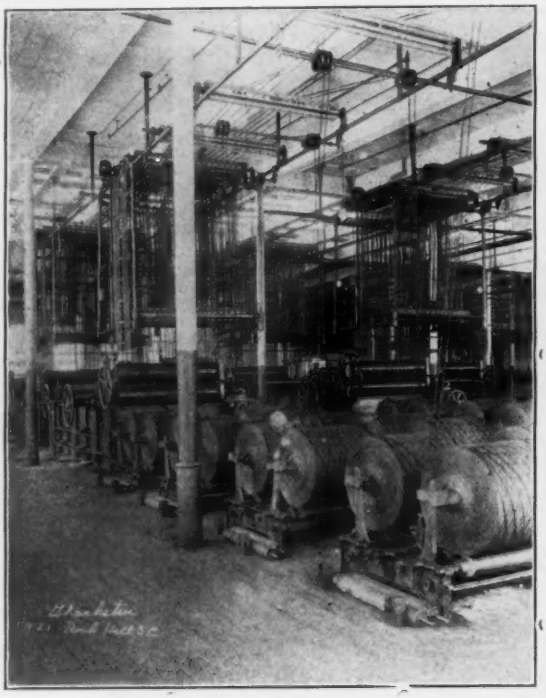
Specialists in Automatic Heat Control

985 Architects Bldg., New York
2761 Greenview Ave., Chicago
596 Boston Wharf Bldg., Boston

The Canadian Powers Regulator Company, Ltd., Toronto, Ont., Canada

Southern Representative: Ira L. Griffin, Charlotte, N. C.

(1324B)



Continuous System Indigo Dyeing Equipment for Warps

In the equipment illustrated fifteen warps are led through a Two Compartment Boiling Out and Cooling Machine, through two Indigo Vats, and taken up by Dye House Ballers in one operation in an initial run.

In a second run the fifteen warps are led through two Indigo Vats, and are taken up by Dye House Ballers.

In a third or finishing run, five of these warps are led through a Two Compartment Wash Box operating in connection with the Dry Cans equipped with a five-unit Coiler.

The successful handling of warps through Continuous Dyeing Systems such as described is only possible through the use of Automatic Tension Controls and Regulators such as we build and use with our Dyeing Equipments.

For further particulars and prices, write or wire

Cocker Machine & Foundry Co.

Gastonia, N. C.

Builders of Warpers, Beamers, Warp Dyeing Machinery

WARPING MACHINERY

Linking Warpers—Linker Heads—Balling Warpers—Balling Attachments—Section Beam Warpers—Special Warpers.

WARP BEAMING MACHINERY

Long Chain Beamers—Short Chain Beamers—Warp Splitters—Special Beaming Machinery.

WARP DYEING MACHINERY

Boiling Out Boxes—Continuous Systems—Sizing Machines—Doubling and Splitting Systems—Sulphur Machines—Indigo Vats—Warp Coilers—Dye House Ballers—Hydro Sulphite Equipment—Warp Bleaching Equipment—Drying Cans.

DURABLE K-W UNIVERSALLY USED

KLAUDER - WELDON
DYEING - BLEACHING-SCOURING MACHINERY

There are K-W machines in use which were built nearly half a century ago and which are still doing their work efficiently and economically under severe service. This is sufficient evidence of the durability and capability of K-W Machines after long years of subjection to the ravages of live steam, heat and alkalis.

K-W Machinery by its accomplishments, has steadily and irresistibly built up a reputation that has made the name "Klauder-Weldon" synonymous with the "world's best dyeing, bleaching and finishing machinery."

Our interest in upholding the K-W reputation means that you MUST be satisfied, and our suggestions to prospective purchasers are made with the view toward solving any dyeing, bleaching or scouring problem for all time. We will be glad to answer any and all questions without obligation on your part whatsoever.

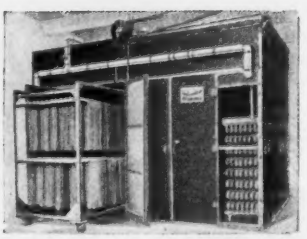
Write today for K-W Literature

THE KLAUDER-WELDON DYEING MACHINE CO.

Bethayres, Pa., U. S. A.

H. G. Mayer, Southern Agent,
Realty Bldg., Charlotte, N. C.

DRYING



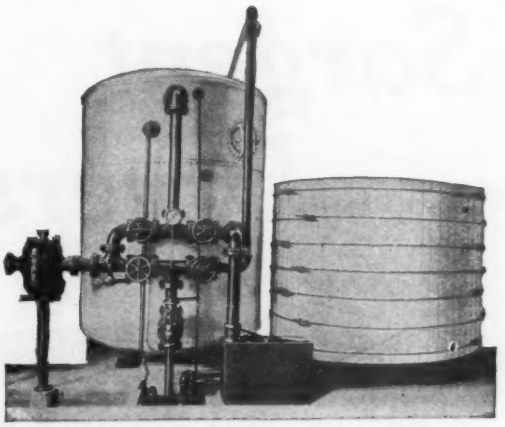
The "Proctor" Truck Dryer for all kinds of yarn in skeins and many other materials—wonderfully compact, efficient, fire-proof. Makes the user sure of correct, trouble-free, most economical drying.

Send for a catalogue. It will acquaint you also with the "Proctor" Automatic Yarn Dryer.

PROCTOR & SCHWARTZ, INC.
formerly The Philadelphia Textile Mach'y Co.
PHILADELPHIA, PA.

"Proctor" DRYERS

How a Cotton Mill Eliminated Streaked and Uneven Dyeing and all Redyeing



The name and address of this plant with full details will be given upon request.

In February, 1919, a well known cotton mill installed Permutit Water Softening Equipment to remove all hardness from the water supply used in their various processes. The following is an extract from a report made by the mill owner after operating on softened water for a year:

"This water is used entirely throughout the bleaching, dyeing and mercerizing operations.

Before installing Permutit, we had considerable trouble in the dyeing of cotton and mercerized yarns, due to unevenness and harsh finish. Since we have used Permutit Water in our dyeing operation we have had practically no trouble due to uneven dyeing and the results are entirely uniform in every process.

We can safely say that Permutit Water has saved us at least 25% in our dyestuff and it has eliminated all trouble in streaked and uneven dyeing. It has also eliminated the work of re-dyeing which we had been put to before using Permutit water."

Permutit Equipment is valuable to dyers because it removes from the water all those impurities that react with dyestuffs causing trouble and losses to the mill. We will analyze any mill water supply free of charge, if written to on the mill letterhead.

You may uncover information that will lead to saving thousands of dollars. It costs nothing to try—write today.

We manufacture all types of equipment for treating water to render it pure and correct for any purpose. We remove iron, manganese or any other impurity. Let us send you our valuable booklet.

The Permutit Company
440 Fourth Ave. New York

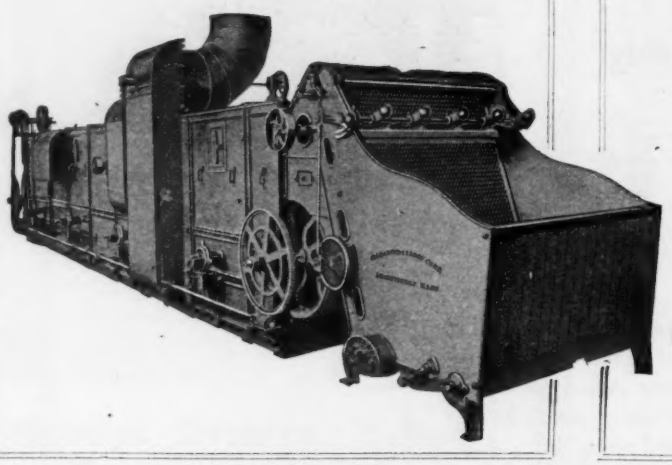
Filters——Water Softeners——Special Apparatus

Zeolite Water Softener Patent Sustained

The Federal Court at Buffalo (Hazel J.) on June 15, 1921, handed down a decision sustaining our broad patent covering Zeolite Water Softeners. According to this decision all Zeolite Water Softeners on the market not made by us are an infringement of this patent.

No need to borrow trouble—buy Permutit—it is the best anyway.

Sargent Dryers



Perfect Satisfaction

Doubtless, in many things that you have bought you have had that feeling of perfect satisfaction that comes from the use of the best that can be bought.

There are over 250 mills who have that feeling about their drying machines—users of Sargent Dryers—machines that take the moisture out of material rapidly and thoroughly without damage to the stock and with less trouble, power and expense.

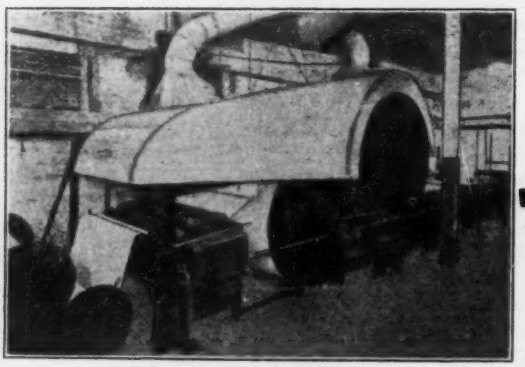
The quality of the material is preserved, and a soft "feel" of the yarn is obtained.

An experience of 50 years of Dryer manufacturing has made Sargent superiority possible. There are over 40 sizes of Sargent Dryers—for cotton, linters, rags, wool or flax—also carbonizing.

Write today for catalog.

C. G. SARGENT'S SONS CORPORATION
GRANITEVILLE, MASS.

Fred H. White, Southern Agent
Charlotte, N. C.



SLASHER HOOD
Patented by R. O. Pickens

WHY NOT TRY

—The Improved, Modern Way

Of operating your Slasher Room by installing

PICKENS

SLASHER HOODS

They collect and carry away all vapors, eliminating condensation on the yarn, assist in the proper drying of the dressed yarn, one of the main factors in the financial success of your mill.

A DEMONSTRATION WILL PROVE OUR CLAIMS
CATALOG ON REQUEST

R. O. PICKENS SLASHER HOOD COMPANY
Spartanburg, S. C.

UNITED PIECE DYE WORKS

DYERS, PRINTERS AND FINISHERS

IN THE PIECE OF

ALL COTTON GOODS

SILK AND COTTON MIXED GOODS

SILK AND WOOL

ALL SILK FABRICS, ETC.

LODI,
NEW JERSEY

NEW YORK OFFICE
132 MADISON AVENUE

MILLS
LODI AND HAWTHORNE

Read What Mr. McCombs Has to Say

"I never have to cut a warp on account of its being soft since I installed recording thermometers on our size kettles and size boxes. Before, I had to cut soft warps at times."

This frank statement was made recently by Mr. J. V. McCombs, Superintendent of the Union Buffalo Mills, Union, S. C.

The instruments referred to are Foxboro Recording Thermometers.

Textile men agree that Foxboro Thermometers on size kettles and size boxes are a good investment. By their aid you can eliminate the uncertainties of cooking starch and thereby secure uniform results, save waste and increase production.

Foxboro Recording Thermometers are dependable and accurate and, by the proper use of the charts, save many times the cost of the installation.

Let us send you bulletin AS 104-1.

THE FOXBORO CO., INC.

FOXBORO, MASS., U. S. A.

New York Chicago San Francisco Tulsa
Pittsburgh Philadelphia Birmingham

FOXBORO
TRADE MARK

118-98

Steam Turbine Driven

HYDRO EXTRACTORS

The Most Satisfactory Drive Where Steam is Available

Turbine is entirely Enclosed.
Belt troubles are eliminated.
Speed closely regulated by reliable governor.
No Packing Boxes to Stuff; no piston rings or slide valves to wear; no bearings to be taken up.
Ball bearings throughout running in oil baths.
Exhaust steam is clean and can be used for boil-off, heating or drying.
No open working parts to gather oil and dust, or throw oil on the goods.
Basket can be started in any position.

FLETCHER WORKS

FORMERLY SCHAUM & UHLINGER
Glenwood Avenue at Second Street
PHILADELPHIA, U. S. A.

Sales Agents:

THOMAS B. WHITTED
Realty Building
CHARLOTTE, N. C.

R. R. STREET & CO.
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HURRICANE ENGINEERING CO.,
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Established 1815

ARNOLD HOFFMAN & CO., Inc.

Providence New York Boston Philadelphia Charlotte

All Kinds of

HEAVY CHEMICALS

Sole Agents for

BELLE ALKALI CO.

of Belle, W. Va.

Manufacturers of

LIQUID CHLORINE

CAUSTIC SODA

Solid and Flaked

We solicit your inquiry for prompt or future delivery

THE GRASSELLI CHEMICAL CO.

DYESTUFF DEPARTMENT

117 HUDSON STREET, NEW YORK, N. Y.

SULPHUR BLACK GAC

SULPHUR TAN G SULPHUR YELLOW BROWN 2 G

SULPHUR CUTCH 2R and BN

SPECIALTIES FOR MERCERIZED COTTON AND COTTON-SILK HOSIERY

DIRECT CORDOVAN—DIRECT NAVY BLUE
DIRECT BLACK G EXTRA

BICHROMATE OF SODA SODIUM SULPHIDE

ZINC DUST, CHEMICALS AND ACIDS

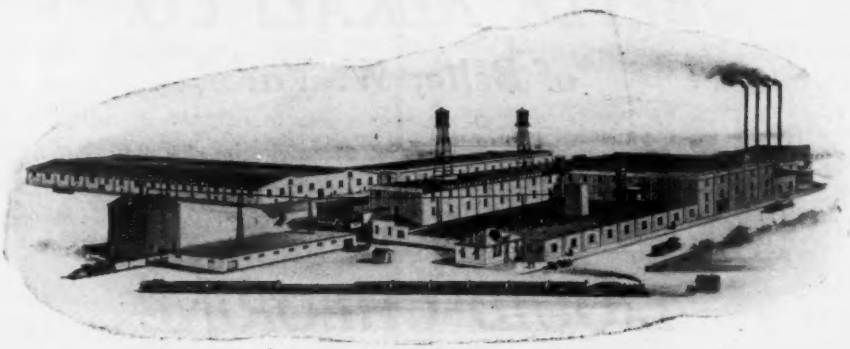
BRANCH OFFICES:

BOSTON PROVIDENCE PHILADELPHIA CHICAGO

CHARLOTTE NEW ORLEANS SAN FRANCISCO

THE GRASSELLI CHEMICAL CO., LTD., TORONTO AND MONTREAL, CANADA.

SOLE SELLING AGENTS FOR **ESSEX ANILINE WORKS, INC.,** BOSTON, MASS.



VICTOR MILL STARCH

The Weaver's Friend

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

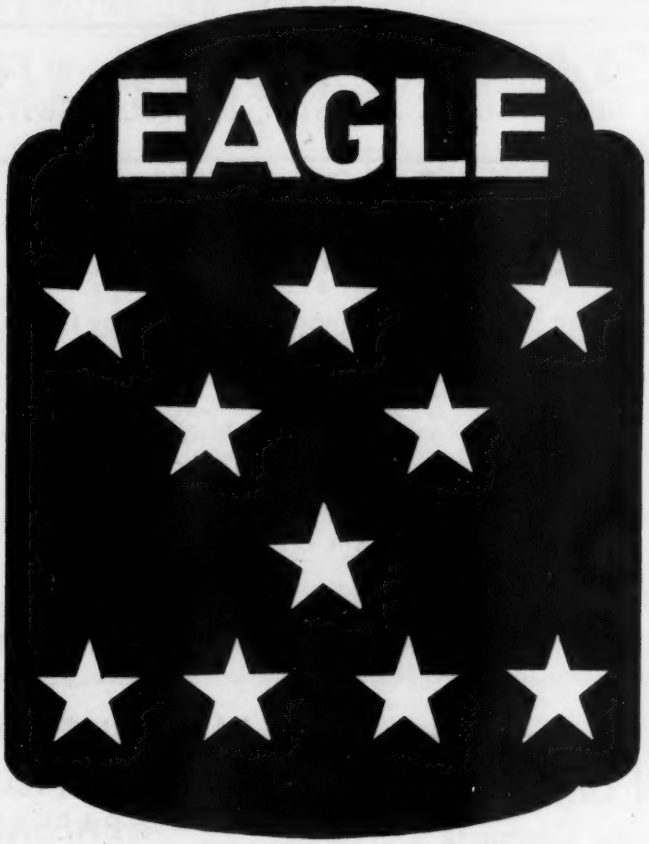
A trial order will convince you that VICTOR STARCH has no equal on the market.

THE KEEVER STARCH COMPANY, Columbus, Ohio

Southern Agent: MR. JAMES H. MAXWELL, Greenville, S. C.

If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.

Starch



—and these stars have a meaning—

They signify the different grades in which Thin Boiling Eagle Starch is offered to the textile industry.

Being the pioneers in the manufacture of **Thin Boiling Starches** we are gratified at the widespread recognition they have received.

Be sure to select the best grade suited to your work. Our knowledge and experience is at your service.

Corn Products Refining Co.

New York

Southern Office *Greenville, S. C.*

Starch

Ciba Company, Inc.

Cedar and Washington Streets, New York

SOLE REPRESENTATIVES IN THE UNITED STATES OF THE

SOCIETY OF CHEMICAL INDUSTRY IN BASLE, SWITZERLAND

Special attention is called to

PYROGENE COLORS

A complete line of the brightest and fastest Sulphur Colors available

SAMPLES AND QUOTATIONS ON APPLICATION

BRANCHES:

Boston Providence Philadelphia Chicago Columbus, Ga.

BOSSON & LANE

Manufacturing Chemists

Specializing

in

BLEACHING

DYEING

SIZING

AND

FINISHING

TEXTILES

Works and Office
Atlantic, Massachusetts

JACQUES WOLF & CO.

Manufacturing Chemists and Importers

PASSAIC, N. J.

ALL SIZING AND FINISHING PRODUCTS

For Cotton

HYDROSULPHITE
For stripping and discharge printing

INDIGOLITE
For indigo discharge.

BENSAPOL
BLEACHING OIL
CREAM SOFTENERS
GLASGOW SIZE
LEVULINE
LUSTROSE
SOLUBLE OILS
WHITE FINISH

MONOPOLE OIL
Reg. Trade Mark No. 70991.

"DEVELOPENE"

Leaves No Argument as to When

"BLACK IS BLACK"

WHY BE SATISFIED

with a RUSTY BLACK when you can have a RICH LUSTROUS BLACK by finishing your Hosiery with the latest, most efficient and satisfying patented preparation

"DEVELOPENE"

A Demonstration Will Convince You

Send us a pair of unfinished stockings, skein of yarn or a piece of fabric—cotton, silk, artificial silk, wool or mixes—which has been dyed black, washed but not finished. We will finish it with **"DEVELOPENE"** and return to you.

There will be such an improvement that you will immediately want **"DEVELOPENE"** for finishing ***your*** goods.

No further softener — or soap — required. Makes hosiery slip on and off the board easily —leaves the product soft and pliable.

Manufactured Only by the

KALI MFG. CO.

1404-1410 North Front Street

PHILADELPHIA, PA.

HYDROXY OIL, KALI CHLORINE NEUTRALIZER, ACETIC ACID AND FORMALDEHYDE

AN OPEN LETTER ON COTTON WARP SIZING

Mr. Cotton Mill Executive:
At one of the recent sessions of the Weavers' Section of the Southern Textile Association in Greenville, S. C., one of the foremost topics discussed was—

"The importance of Slashing and its direct bearing on the major subsequent process—Weaving."

In New England also, cotton mill executives are giving the slashing department closer study than ever before, because cotton warp dressing, is one of the most important factors in any cotton weaving mill. This, because of its far-reaching effect in the subsequent processes of bleaching, dyeing and finishing.
During the past decade, our staff of experienced textile chemists have demonstrated the advantages of AMALOL and GLUANTINE in numerous representative cotton mills.
The mills we have gained then are still consistent users of AMALOL and GLUANTINE, because of their proven values.
Regardless of whether you are a user of beef tallow, rectified tallow or compounded gums, we are prepared to demonstrate, without obligation, the advantages of AMALOL and GLUANTINE.
Neither AMALOL nor GLUANTINE contain Magnesium Chloride.
Trial barrels cheerfully shipped on approval.

L. SONNEBORN SONS, INC.
Textile Products Division
262 Pearl Street, New York City

Unnecessary Expense

Why should you go to the heavy expense of repainting walls and ceilings when a trial of

WYANDOTTE DETERGENT

will convince you that a washing with this unusual cleaner will give results that many times prevent this unnecessary repainting expense.

This is not an invitation to experiment with an untried product, for Wyandotte Detergent is saving maintenance cost in hundreds of mills the country over.

It is equally as successful in the cleaning of marble, tile, mosaic floors, and wainscoting, also enameled surfaces.

Indian in diamond

in every package.

Wyandotte Detergent is guaranteed to produce the results claimed for it or the trial costs nothing.

Order from your supply house.

The J. B. Ford Co., Sole Mnfrs.,
Wyandotte, Mich.

STANDARD DYES
OF
UNIFORM QUALITY

FAST LIGHT YELLOW—
The Fastest Sunlight Resisting Yellow ever produced

KANAWHA CHROME BLACK E H K—
Soluble, a Jet Black suitable for vigoureux printing

KANAWHA CHROME FAST BLACK D—
A Jet Black fast to iron

KANAWHA CHROME BLUE BLACK 6 B—
Soluble and very suitable for vigoureux printing

Also Colors for Cotton, Silk, Wool, Leather, Paper, etc.

Laboratory Service

A. KLIPSTEIN & COMPANY

644-652 GREENWICH STREET NEW YORK CITY
Branches:
Boston Philadelphia Chicago
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SAVOGRAN

The Standard Pure, Soluble Soap Powder
In Use for 46 Years

INDIA ALKALI WORKS
BOSTON, MASS.

"BRETON"
MINEROL "F"

For

Knit Goods

"It gives a silky feel"

BORNE, SCRYMSER CO.
Established 1874
80 South Street, NEW YORK
BOSTON **PHILADELPHIA**
Works: Elizabethport, N. J.

THE
"Southwestern Iron Clad"
Is the IDEAL Cotton Mill Broom

Only the best grade of broom corn is used in these brooms—they are built strong and will withstand the hardest usage.

The light weight, yet strong and substantial shields used gives the broom ample protection and at the same time allows the proper amount of of broom corn to be used, thus giving them excellent sweeping qualities.

MADE RIGHT!
PRICED RIGHT!

Inquiries and orders receive prompt attention.
Sold direct and through
all principal distributors.

The Southwestern Broom Mfg. Co.
Evansville, Indiana

BOSTON HANK CLOCKS
The Recognized Standard for Accuracy and Durability

Many thousands in use.

Lasts many years.

All parts interchangeable.

Prompt delivery.

Special clocks to order.

Write us your requirements.
Our experience is at your command.

Boston Clocks tell just what the production from each frame actually is

BOSTON MACHINE WORKS CO.
LYNN, MASS. U.S.A.

Offices at
Cincinnati, Ohio. Milwaukee, Wis. St. Louis, Mo.

WE EXTEND
SEASON'S GREETINGS

FIG.20.

And express our sincere appreciation of your friendship and patronage over so many years

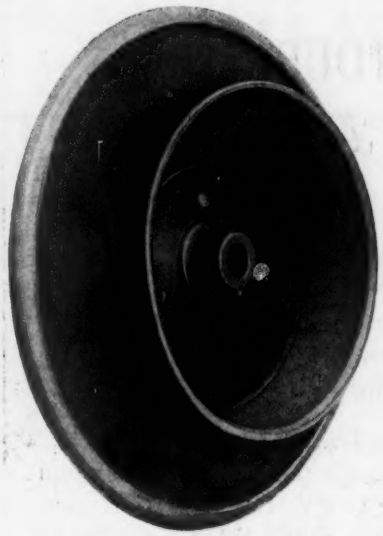
Each succeeding year finds your interests and ours more closely interwoven.
So when 1922 opens its doors of opportunity

"LET'S GO" TOGETHER

FIG.27

W. T. LANE & BROTHERS Manufacturers **Poughkeepsie, N. Y.**

ALL STEEL
Loom Beam Heads



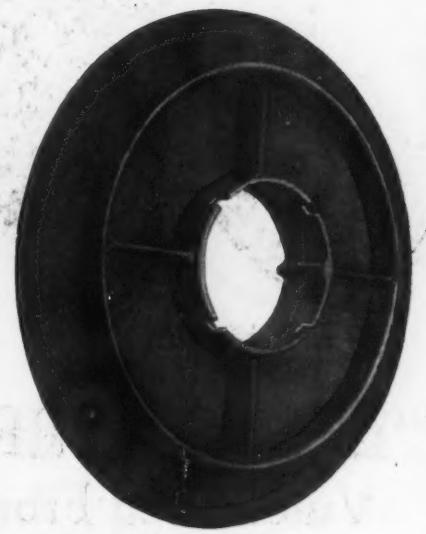
Patent Pending

Eliminate breakage and replacement.

Will not bend or spring in warping or in ordinary handling of beam.

Construction is such that your cast-iron head can be duplicated.

Ask for catalogue.



Patent Pending

Mossberg Pressed Steel Corporation
Attleboro, Mass.

OUR SERVICE OFFERS

COTTON MILLS
A WIDE AND READY
MARKET
FOR THEIR USED TEXTILE MACHINERY & SUPPLIES

We are constantly designing and equipping mills for which we require high-class used machinery at fair cash prices. Send us a list of your offerings and start the way for a sure sale.

WE CAN ALSO FURNISH ADDITIONAL CAPITAL FOR TEXTILE ENTERPRISES

WATCH THIS SPACE
MONTHLY

WANTED

Breaker and Finisher Pickers 40" Rev. Flat Cards 12 x 6" Slubbers. In replying please send full description as to age, condition, etc.

TEXTILE SERVICE & EQUIPMENT CO.
CLEVELAND, OHIO

FIG. 2. LESTERSHIRE FIBRE HEAD SPOOL

"LESTERSHIRE" Vulcanized Fibre Head Spools

Lestershire Fibre Head Spooler and Twister Spools are the most economical Spools in use today. They will last longer, give better service and increase your production.

Write for details as to how these Spools will save you more than their original cost in the first six months' use.

Lestershire Spool & Manufacturing Co.

Johnson City, N. Y.

Spool heads that will not break, splinter nor roughen, with dogwood or fibre spindle bearings.

YOUR CARD AND COMBER BRUSHES

Should be attended to NOW —their proper condition will materially aid you in speeding up production.

The cost of Keeping Them in Proper Condition is about FIFTY CENTS per year. BY SPENDING THAT FIFTY CENTS NOW, WILL HELP YOU MAKE THOUSANDS DURING THE YEAR.

OUR REPAIR DEPARTMENT

Is Equipped to turn out the Highest Class of Repair Work on the Shortest Notice, which is Guaranteed.

ESTIMATES FURNISHED.

Distributors of

Garvey Stencil and Marking Ink

A non-evaporating waterproof Marking Ink which is impossible to rub off. COMES READY FOR USE.

Atlanta Brush Co.

Successors to

D. D. Felton Brush Company

Central and Trinity Aves.

ATLANTA, GA.

Pat. Applied for

SPUR-CAP SHELLS

Made to Stand the Hard Knocks

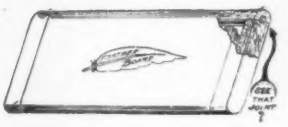
MANUFACTURED BY

GALLAUDET AIRCRAFT CORP'N.,

EAST GREENWICH, R. I.

FEATHERBOARD

The Master Cloth Reel



LIGHT AND STRONG. IMPROVES YOUR PUT UP.

TEN YEARS or more with the same loom-harness when you weave with

"DUPLEX" FLAT STEEL LOOM HARNESS

STEEL HEDDLE MFG. CO.

GREENVILLE PHILADELPHIA PROVIDENCE

Southern Office

511 Masonic Bldg., Greenville, S. C. : Hampton Smith, Southern Manager

N. B.—We are the sole manufacturers of nickel-plated drop wires for every kind of loom.

PRINTING

FAIR PRICES AND PROMPT SERVICE

Numbered among our most satisfied customers are some of the largest mills in the South, for whom we print time cards, time sheets, and their various printed and special ruled forms

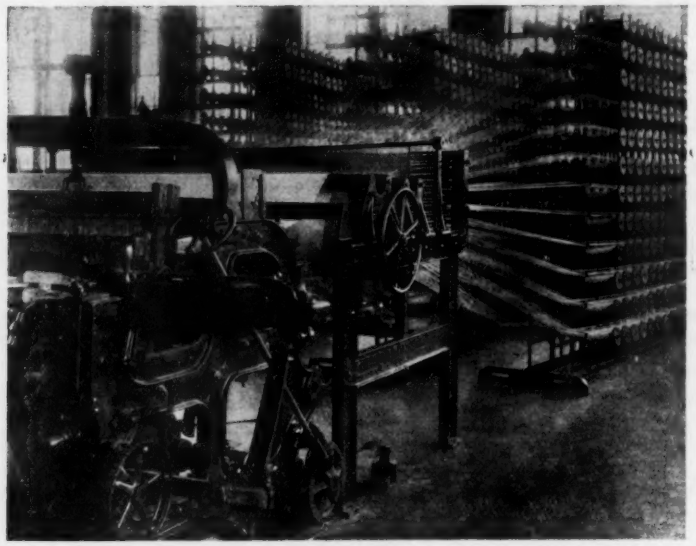
Our plant is one of the largest and most completely equipped printing plants in the South. Our long experience enables us to produce the most perfect printing and service, and our large volume and purchasing power enable us to save you money on your printing.

Just as we please our other textile mill customers, so we can please you. Let us quote prices on your next printing order.

The **A. J. SHOWALTER** *Company*

DALTON, GEORGIA.

DIRECT WEAVING OUTFITS FOR CORD FABRIC



WARPER CREEL and TENSION DRESSER in connection with cord fabric loom

HIGHEST EFFICIENCY TEST IN YOUR GOODS. **Production plus QUALITY**

WARP COMPRESSING MACHINE CO. -:- Worcester, Mass. U. S. A.

Representative: F. W. KIESSLING, *Worcester, Mass.*

Odd, Isn't It

—that some people think of advertising as a means of benefitting only the seller, when its basic function *must be* to render a necessary service to the buyer, else it could not exist. Merchandise lives or dies as it does or does not meet a human need. Advertising is subject to the same law of service The real measure of its value is what it *gives*, not what it gets.

In the light of these truths, the marvelous growth of advertising in itself, is an impressive demonstration of its essential character in our economic system.

But you are not interested in *all* advertising any more than you are in all merchandise. That is one big reason why you have a highly specialized Business Paper in your field such as the one carrying this advertisement. It was born of your needs, not of any man's desire to be a publisher.

Timely, authoritative, comprehensive, statements about needed materials pass in review as the advertising pages are turned. Confident judgments can be formed, and intelligent decisions made.

Yet advertising is NOT an *added* expense, but an improved distributive process, which takes the place of slower, more costly and less efficient methods.

That is why it pays to *read* advertising even more than it pays to advertise. Especially if you read it in COTTON, for one of its standards of practice requires it to *decline any advertisement which has a tendency to mislead or which does not conform to business integrity.*

AMERICAN

SUPPLY COMPANY

PROVIDENCE, R. I.

MANUFACTURERS OF

Loom Harness,
Weaving Reeds,
Oak Tanned Leather
Belting, Strapping
Etc.

We make a specialty of Harness for Warp Drawing Machines

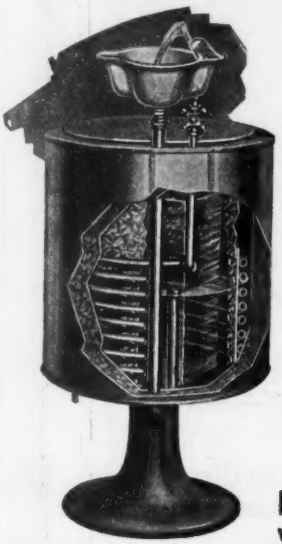
NOTE—No orders too large for our capacity. None too small to receive careful attention.

Puritan CANTONMENT DRINKING FOUNTAINS

Sanitary and Practical

Practical drinking mound is formed by mechanical means. Interference is set up in stream which retards water at the apex of arc. This stream makes it impractical to drink from any other point, thus insuring perfect sanitation.

Approved by the U. S. Government. Now recognized by largest interests and schools in the country.



Puritan "Cantonment" Coolers are designed to connect with pressure lines and are so constructed that the drinking water does not come in direct contact with either the ice or ice water, but is circulated through brass coil which is tinned both inside and outside.

Write today for illustrated literature.

Halsey W. Taylor Company

Warren, :: :: :: Ohio

Sanitary Wash Bowls

One Type of Our Bowls.

Our Line of Sanitary Equipment Includes:

Sanitary Wash Bowls (in batteries), Bubbling Fountains (plain and ice cooled), Metal Lockers, Metal Stock and Pattern Storage Racks, Metal Shelving, Metal Cabinets, Vault Fixtures, Soda Kettles (40 and 60 gallons), Metal Stools and Chairs, Water Mixers, Work Benches, Bench Legs, Full Line of Plumbing Fixtures, etc.

Send for Complete Catalog.

Manufacturing Equipment & Engineering Co.

136 FEDERAL STREET, BOSTON, MASS.

Works and Mail Address: Framingham, Mass.

VERMONT SPOOL & BOBBIN CO.

OF

BURLINGTON, VERMONT.

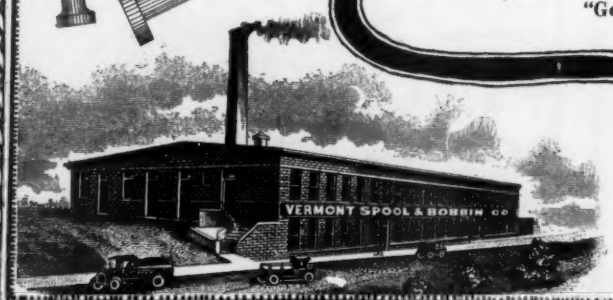
There are two prime requisites in the production of superior bobbins and spools—the plant and long experience. We have both.

Our plant is equipped with the most up-to-date and efficient machinery. From the selection of the wood to the finishing of the product the same care is exercised in every department—uniform bobbins and spools of the highest class being the result.

Our long experience in the design and manufacture of spools and bobbins for textile mills all over the country enables us to understand your requirements and give you 100% satisfaction.

Give us a trial order and you will remain one of our satisfied customers. Write for prices.

"Good Goods at Fair Prices."



ROLLER CLOTH

with just the right cushion and uniformly even surface to produce good cotton yarn.

CLEARER CLOTH

with thick, strong nap that does not pull out and is of uniform length so that it will clear the rolls of all short fibre.

SLASHER CLOTH

porous and having sufficient cushion to thoroughly force the sizing into the yarn.

For many years we have been furnishing the leading cotton mills with cloths that meet every requirement. Their uniform high quality insures long service. Their use produces the best yarns at the least cost.

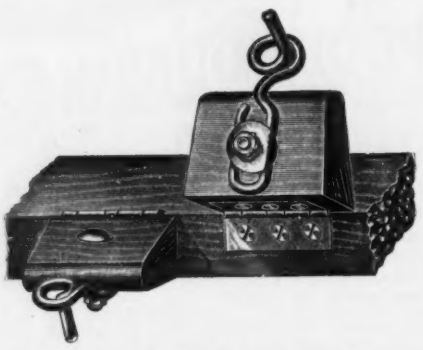
A trial order will convince you of their superiority and economy.

PHILADELPHIA FELT COMPANY

FRANKFORD, PA.

Southern Sales Agent: M. C. Sanders, Greenville, S. C.

The Palmer Adjustible Thread Guide



For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

Convenient for quick reference

Catalogs, price lists, rate books and other important reference papers are immediately at hand in the

Kleradesk

They are out of the way in their indexed compartments until wanted. It also sorts and routes mail, memos, orders, etc., for all to whom mail is distributed. Saves time. Efficient. Convenient.

A Steel Sectional Device

Add compartments as required. Sections $1.20 each. Six-compartment Kleradesk illustrated below only $8.40. Indexed front and back. Write for free, instructive, illustrated folder, **"How to Get Greater Desk Efficiency."**

Ross-Gould Co.

318 N. 10th—St. Louis (9)

New York Chicago Philadelphia Cleveland

"Clean Floors Reflect Clean Business"

No. 10 FINNELL SCRUBBER for scrubbing under low objects.

No. 5 FINNELL SCRUBBER for open areas

300 GREAT MILLS Have Reduced Waste and Soilage

Three hundred great textile mills were amazed to find that the FINNELL SYSTEM of Power Scrubbing did more than slash scrubbing expense. They learned that it contributed greater cleanliness to floors and AIR—and kept materials CLEAN.

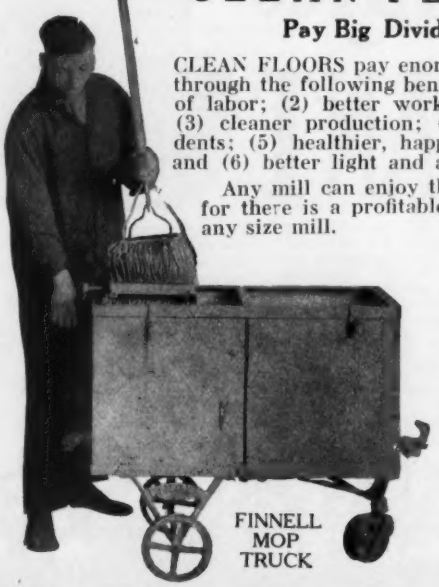
But even more than that. The example of care and thoroughness which the system set for the workers was reflected in the work of the entire force. Carelessness and waste have been reduced wonderfully, saving huge sums of money.

CLEAN FLOORS

Pay Big Dividends

CLEAN FLOORS pay enormous dividends through the following benefits: (1) saving of labor; (2) better working conditions; (3) cleaner production; (4) fewer accidents; (5) healthier, happier employees; and (6) better light and air.

Any mill can enjoy these advantages for there is a profitable size outfit for any size mill.



FINNELL MOP TRUCK

Write Today for Proof

Get complete information on the dividend - paying Finnell System. No obligation. Write today.

American Scrubbing Equipment Co.

General Offices and Factories 1229 N. Collier St., HANNIBAL, MO. District Offices in Principal Cities

"Clean Floors Reflect Clean Business"

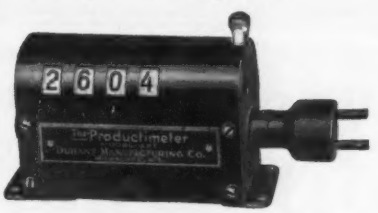
Actual Costs vs. Estimated Costs

If *actual* costs were never more than *calculated* costs, what a happy life yours would be!

And there's a way to come *mighty near* that condition.

The Productimeter

Put this little pacemaker on the job. It tells you, or your overseer, just what each machine is doing—whether it is keeping up to its calculated, or standard, rate of output—just when to cut off—exactly what to pay the operative—how soon another job can be put on.



It tells the operative his rate of work—so he keeps up his established record, or beats it. This speeds up production. The cause is psychological—not mechanical.

Send for our catalog, and post up on how you can make *actual* costs no higher than *calculated* costs. If you have any special problem of a counting or measuring nature, put it up to us. We can help you out, because we have made a lifetime study of *measuring production.* This service is free—our contribution to speeding up production.

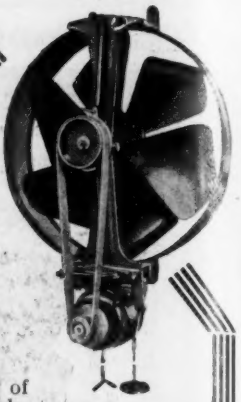
Durant Manufacturing Co.
633 Buffum St., Milwaukee, Wis.

(1257)

PERBURCO
HOSPITAL EQUIPMENT
Whatever your needs for a first-aid room or the largest hospital, PERBURCO Hospital Equipment will satisfactorily and economically fill your requirements better than any other equipment. Acknowledged and specified by the profession and leading authorities. We will be glad to send experts to advise with you and specify equipment best suited to your needs.
Our new catalog gladly sent on request.
PERRYMAN-BURSON CO.
Expert Truss Fitters
23 Houston St., Phone Ivy 5522
ATLANTA, GA.

FRESH AIR

is as essential to the efficiency of your working force as modern tools or office equipment.



The Bayley Junior DISC Fan

supplies a constant volume of pure fresh air to your workrooms, removes four air, smoke, noxious fumes and keeps your working force at its highest and most productive pitch.

It is made in sizes from 20 to 48", either for line shaft drive, or with variable speed motor drive. The patented adjustable belt-tension speed regulating device permits the use of a standard constant speed motor, yet allows a speed variation of from 2½ to 100% of full speed.

Send for buletin today

BAYLEY MFG. CO.
Dept. I, Milwaukee, Wis.

BYRD'S SERVICE

A combination of

EFFICIENCY, PROMPTNESS and ECONOMY in the production of printing

With the largest printing equipment in the Southeast, and with thirty-five years experience, we are in position to handle all of your printing requirements from the smallest office form to the largest illustrated catalog.

Send your next requisition for printing to us—we make the price right.

BYRD PRINTING COMPANY

Established 1887

BYRD BUILDING :: ATLANTA, GA.

The VERTICO-SLANT

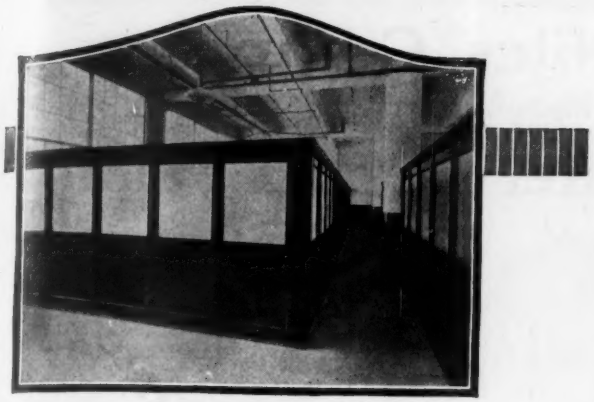
ONE of the greatest sources of, and aids in, the spreading of disease is the drinking fountain, public or private, if the water jet is vertical. SCIENCE has PROVEN this as an indisputable fact by actual test. It's NOT A THEORY.

The vertical stream falls back into the fountain head germ-laden from the drinker's mouth to be carried to the mouth of the next drinker.

"VERTICO - SLANT" STREAM FOUNTAINS have been especially designed to do away with this menace by jetting water at an angle that does not permit it to fall back to the fountain head.

Our Fountain Equipment is Simple Yet Absolutely Sanitary. Write for catalog.

RUNDLE-SPENCE MFG. CO.
MILWAUKEE WIS.



Where Fatimas are made

IN the plant offices of the Liggett & Myers Tobacco Company at Richmond, Va., you find SANYMETAL Office Partitions. Just as Fatima Cigarettes have won the approval of many discriminating smokers, SANYMETAL has become the standard of quality in factory, office and toilet partitions among careful buyers. In the minds of many architects and owners, to use a "Fatima expression," **nothing else will do.**

The convenient adaptability of SANYMETAL Unit-Sections to any space and plan; their permanent rigidity when installed; their faultlessly finished surface, the same on both sides; their neatly designed panels and moldings; their impression of clean-cut, business-like utility and dignity—these features have made SANYMETAL the outstanding value in its field. We have a Booklet showing Office Partitions exclusively—ask for it.

A Fact:

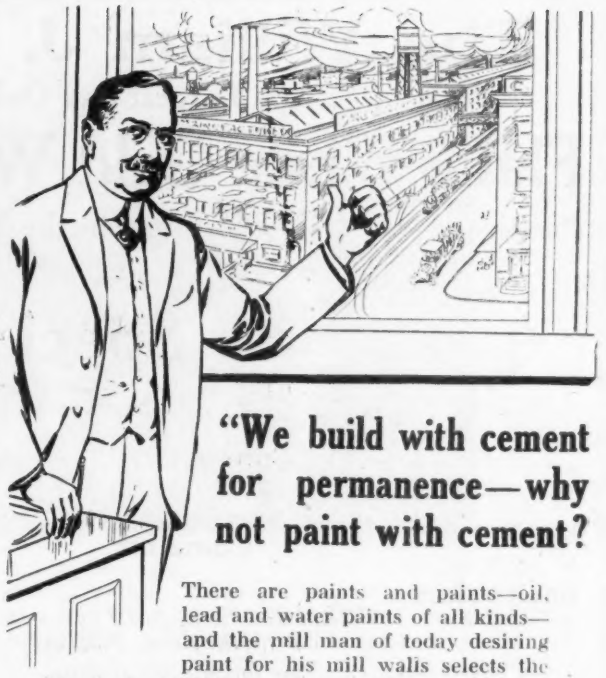
---the home of Fatimas is only one of many well-known plants in which SANYMETAL Products are installed.

THE SANYMETAL PRODUCTS COMPANY

986 E. Sixty-fourth St., Cleveland, Ohio

Sanymetal

TRADE MARK U. S. REG.



"We build with cement for permanence—why not paint with cement?"

There are paints and paints—oil, lead and water paints of all kinds—and the mill man of today desiring paint for his mill walls selects the brand almost blindly because most of them are good.

But getting right down to rock bottom facts, the main essential in a paint is permanence. It of course must stay white, but above all it must make the painting investment a permanent investment by STAYING on the walls without a crack.

Cement has made such a paint possible—has made our claims for **permanence** in painting truthful. White Portland Cement reprocessed with suitable minerals is the basis of

Zemco-lite

TRADE MARK

"The Cement Paint"

This perfected paint cements itself to the wall, whether it be wood, plaster, brick, iron, steel or concrete surface. It depends on cement for its adhesive qualities and not upon gums or glues which decompose.

A Zemco-lite wall is a pure white semi-flat finish which stays white, never discoloring, and because of its wonderful light refracting properties it gives an interior perfectly lighted and free from glare. It sets in a hard coating, too smooth to catch lint or mill dust. It is unaffected by steam or moisture or any acid fumes, and is fire-resisting and sanitary. It can be used outside or inside the mill, and can be secured in different colors for outside work.

Zemco-lite is put up in dry powder form, but it is a paint, not a calcimine. Its initial cost per gallon, compared with other paints, is very low, its covering capacity large, and it is applied more easily and cheaply than lead or oil paints.

Ask today for full information and prices.

American Cement Paint Co.

Chattanooga, Tennessee

The William J. Niles Company

The Largest and Only Manufacturers of

Flake White Cold Water Cement Paints

Positively Pure White in the World Stays White

Will Not Peel, Buckle, Chip or Come off

Specialists

Spray or Brush

Schools
Hospitals
Asylums
Warehouses
Mills
Factories
Universities
Stucco
Concrete
Dwellings

or in colors or in colors

The Newest, Cheapest, most Sanitary and Dependable Paint on the Market
No Oil, No Poisonous ingredients

Can be applied by any one. 32 Gal. t oBbl., 300 lbs. to Bbl., will cover 7000 sq. ft.
Send for Price List and Catalogue an d our Time and Material proposition.
Always ready for use. All manufact urers should have a supply on hand.
Office and Plant: Trenton Avenue and Rush Street

Philadelphia, Penna.

VOGEL PATENTED

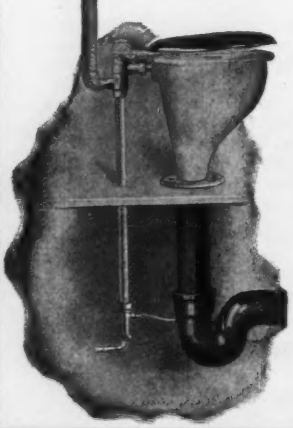
FROST PROOF CLOSETS

They require no pit.

They save water.

All bowls have enameled rims. In service daily, winter and summer.

No. 1



OVER 350,000 *Giving* *Satisfaction in All Climates*

The ideal water closets for Factories and Mill Villages, where thousands have been installed.

The most durable water closets made — excepting none.

Every Fixture Tested Under Hydraulic Pressure Before Leaving Factory.

INSIST ON GETTING THE VOGEL

Ask your jobber

JOSEPH A. VOGEL CO.

Factory and Office at
WILMINGTON, DEL.

VOGEL PATENTED

No. 5 FACTORY CLOSET

This fixture fills the demand for a strong and durable automatic water saving closet outfit for factory use. The valve device is extremely simple and repairs, though seldom necessary, can be made by removing the valve cap back of bowl.

Residence For Mr. G. Gunby Jordan, Columbus, Ga.

ARCHITECTURAL DEPARTMENT

ROBERT AND COMPANY
ARCHITECTS AND ENGINEERS
ATLANTA

ONLY A FEW DROPS OF OIL
FOR SAFETY

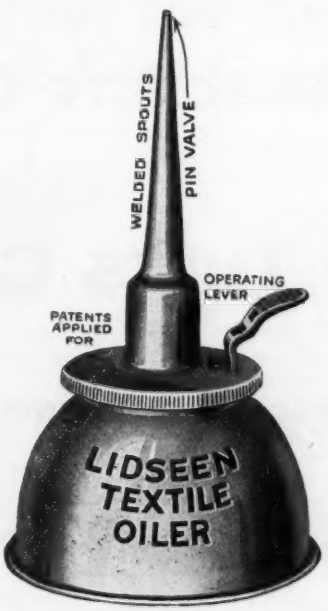
Remove from the hands of your workman the old-fashioned hit or miss oil dripping, oil wasting, time consuming oil can and replace with this wonderful

OIL DROPPING OILER.

You can
SAVE OIL
SAVE GOODS
SAVE TIME

Ask

MR. J. S. HULME
Atlanta Trust Bldg.,
ATLANTA, GA.
Southern Representative.



½ Pt. 4" Spout

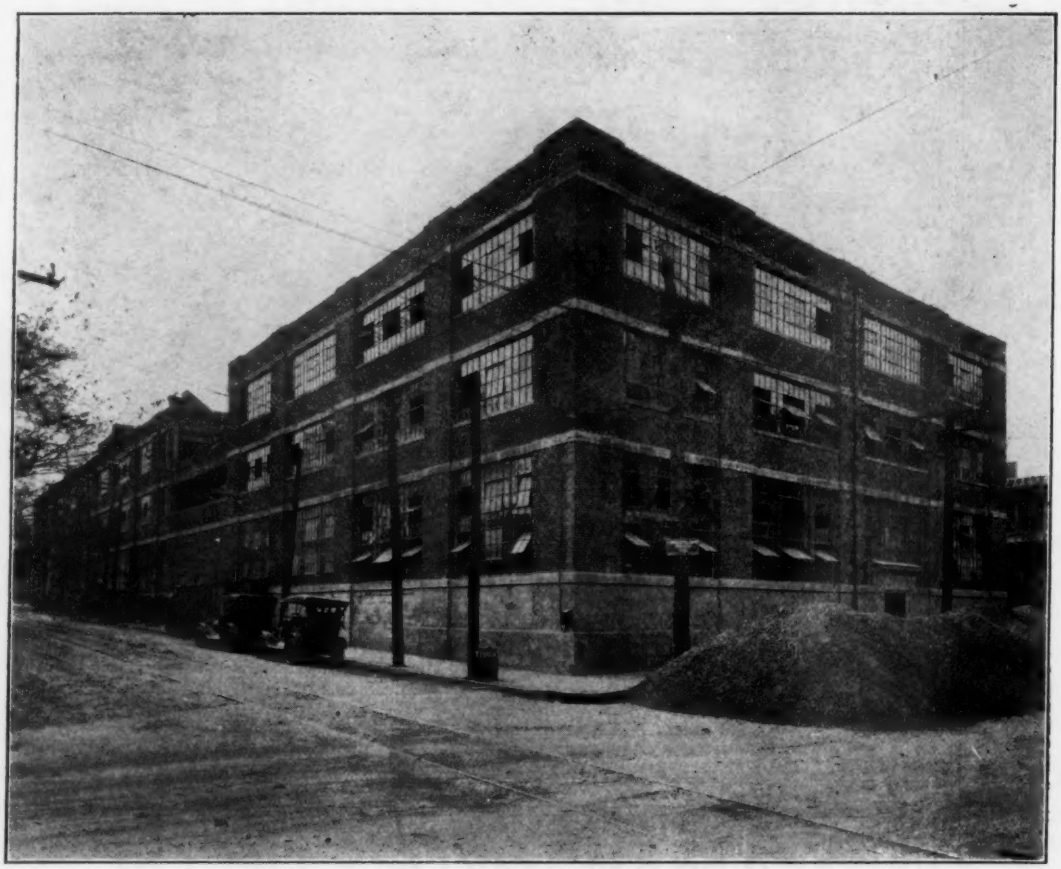
This oiler is most wonderful in its operation. So set as to only emit a few drops of oil and no more. The pin head valve prevents leaking from end of spout.

This oiler was

MADE FOR THE TEXTILE INDUSTRY

You can
SAVE MONEY
SAVE WORRY
SAVE CUSTOMERS
IT'S A *LIDSEEN* PRODUCT

832-840 So. Central Ave.
CHICAGO.



FACTORIES AND WAREHOUSES

RE-INFORCED CONCRETE CONSTRUCTION

ARTHUR TUFTS COMPANY

CONTRACTORS AND ENGINEERS

ATLANTA, GA. BALTIMORE, MD.

Runs Absolutely True On Pulleys— Smooth and Noiseless

Fabreeka Belting

has the same condensed fibre as leather and corresponds with leather in thickness and weight. But it works better than leather and costs less than leather.

For high speed it is in a class by itself and attains a degree of efficiency unknown in leather belts.

It is doing the work better and relieving the troubles of many belt users where conditions were considered beyond relief. You cannot appreciate the true merits of this belt until you have tried it out. Absolutely impervious to oils, acids, water, and other elements destructive to ordinary belts. Less first cost, less stoppage from belt troubles, a saving of power and increased production from its use are the results.

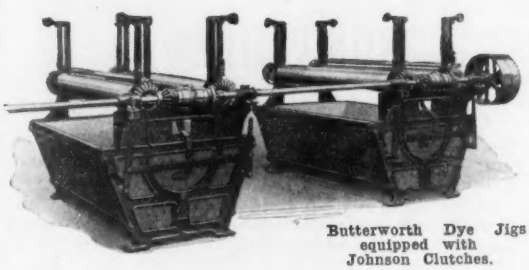
Write today for full information and prices.

Fabreeka Belting Company

30 India Street **Boston, Mass.**

THE JOHNSON FRICTION CLUTCH

That Drive on Your Dye Jigs— Has It Ever Caused Trouble?



Butterworth Dye Jigs equipped with Johnson Clutches.

Friction Control Means Better Machinery

There are many drives in the dye house which can be handled most efficiently by a good friction clutch. We design clutches to meet any requirements and are always glad to consult on your problems.

Write for our Catalog G.

Are you using a jaw clutch that jerks and grabs,—or a friction clutch that slips and falls down on the job? It is a common difficulty and a troublesome one.

H. W. Butterworth & Sons Company, builders of one of the oldest and best lines of dyeing and finishing machinery, have found a decided advantage in the Johnson Clutch for this work. Dyeing establishments all over the country are now using Johnson Clutches on Butterworth machines in the arrangement shown here, and know from actual experience that they are capable of the finest service.

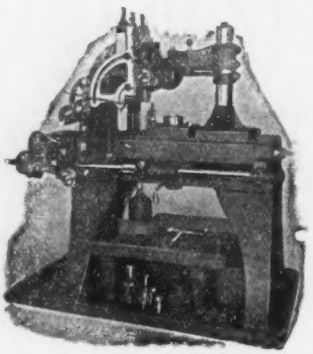
The Johnson Clutch has been applied with equally good results on other machines of this type, and on textile machinery generally—in the dye house and elsewhere. By its compact, enclosed design and its smooth and easy operation, it is admirably suited to the requirements of the textile shop.

Johnson Double Clutch as used on Butterworth Machines.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

FULL AUTOMATIC, SEMI-AUTOMATIC and HAND OPERATED

Gear Cutting Machines

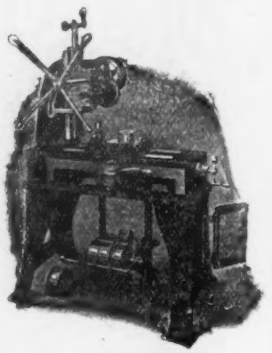


Especially Adapted for Use in

Cotton Mills.

Hundreds Now in Use.

Send for special circulars.



The D. E. Whiton Machine Company

New London, Conn.

CRESSON-MORRIS CO.

POWER TRANSMITTING MACHINERY

Merit Plus Recognition

"The heights by great men reached and kept were not attained by sudden flight."

Time, skill and effort must also precede merit as surely in machinery as in men.

Time, skill and effort must also precede merit in order to obtain and maintain for merit the recognition it deserves.

The great number of large installations of Cresson-Morris Power Transmitting Machinery is proof of both the merit and the recognition of the merit that nearly three score years of skill and effort have endowed it with.

The cumulative knowledge of all this experience is always available to you in the recommendations of our engineers.

CRESSON-MORRIS COMPANY

ENGINEERS—FOUNDERS—MACHINISTS

PHILADELPHIA, PENNA.

Branch Office, 141 Milk St., Boston, Mass.

20

Old-fashioned Oil is Out of Place in a Modern Mill

Mill men don't want liquid oil because it is wasteful and messy—it simply won't stay in bearings but drips and spatters all over machines and goods being manufactured.

So they've chosen

TRADE MARK REGISTERED IN UNITED STATES PATENT OFFICE

NON-FLUID OIL

Modern Textile Lubricants

because NON-FLUID OIL won't drip or spatter, and besides keeping the machines clean, saves trouble and expense of oil-stained seconds.

And mill men found that NON-FLUID OIL lasted longer in bearings—3 to 5 times as long, saving in lubricant and requiring fewer trips with the oil can.

And as for service—the mill man knows that NON-FLUID OIL gives more constant and more positive lubrication than liquid oil.

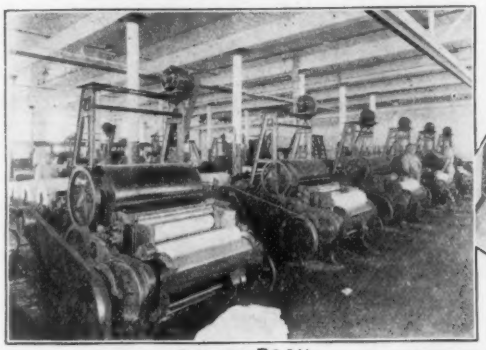
So why not use it?
We'll send you a try-out
sample—just drop us a card.

New York & New Jersey Lubricant Co.

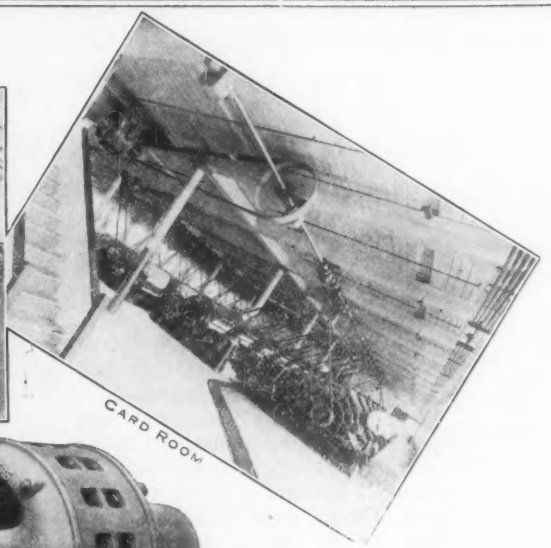
401 Broadway New York

Southern Agent, L. W. Thomason, Charlotte, N. C.

Ample Stocks at our Branches:
Charlotte, N. C.; Greenville, S. C.;
Atlanta, Ga.; New Orleans, La.

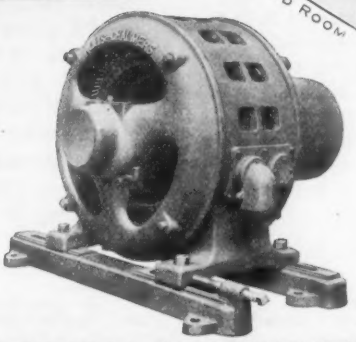


PICKER ROOM



CARD ROOM

ALLIS-CHALMERS Motors more than meet the requirements of the Textile Industry.



Send for Textile Bulletin No. 139.

ALLIS-CHALMERS MANUFACTURING CO.
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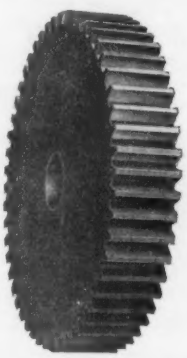

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Replace noise with silent operation. Remove the clanging din of grinding gears. Get better working conditions, increased production and lower cost of operation.

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will give you services in places and under conditions that once were prohibitive to the average silent gear. This remarkable non-metallic, self-supporting material will not warp, shrink or swell. It is waterproof, chemically inert, insoluble and infusible—extremely high in dielectric strength and requires no shrouds or end plates. Give Condensite Celeron Gears a trial.

We do not cut gears but—we will be glad to give you the names of experienced gear cutters near you who can supply Condensite Celeron gears and pinions. Get all the facts. Write us today.

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PUT YOUR SLASHER CYLINDERS ON BALL BEARINGS

Hard pulling cylinders mean stretched warps and poor weaving. With ball bearings on the cylinders, a pull of less than twenty pounds will keep them in motion, so that there is no excessive strain on warps; the elasticity of the yarn is preserved, and better weaving is possible.

Our ball bearing boxes for slashers are moderate in cost, and can be installed by anyone in about an hour. They are dust-proof, and require oiling only two or three times a year.

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In the struggle and stress of modern business life every moment of delay represents a loss of time and money which cannot be regained.

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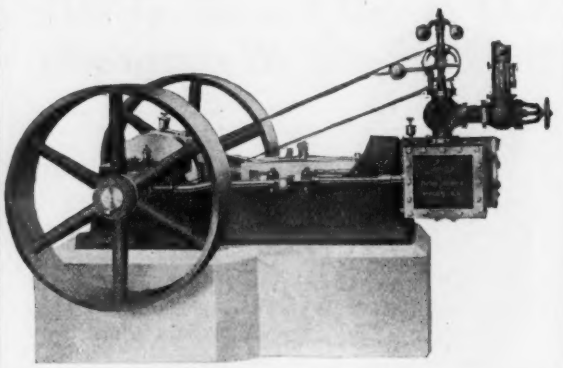
You can now purchase apparatus which has been tried and proven in over 300 cotton mills—apparatus of the highest grade and efficiency—at a lower cost than ordinary equipment.

Send today for New Prices



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The manufacturers of a number of America's well known textile products can vouch for the strength, uniformity, cleanliness, and better weaving and knitting qualities of our yarns.

The yarns we spin for knitting, weaving, laces and converting, are furnished in all twists on skeins, cones, tubes and warps:

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CHAMBRAYS: 19000 Range, Invincible Suiting, Romper Cloth, 32 in. wide.

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COTTON FLANNEL SHIRTING: 2601, 2701, 2801, 32 in. wide.

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26 inches to 120 inches wide

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37 inches wide, 7, 7 1-2, 8, 9, and 10.38 ounce.

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28 1-2 and 36 inches wide, 7, 8, 9, 10, 12 and 15 ounce.

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29 and 36 inches wide, 7, 8, 9, 10 and 12 ounce.

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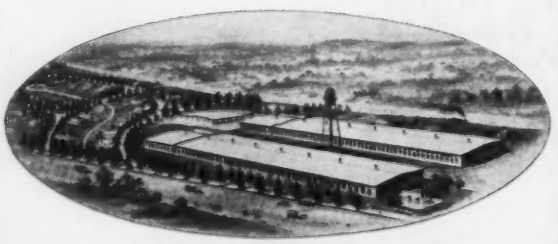

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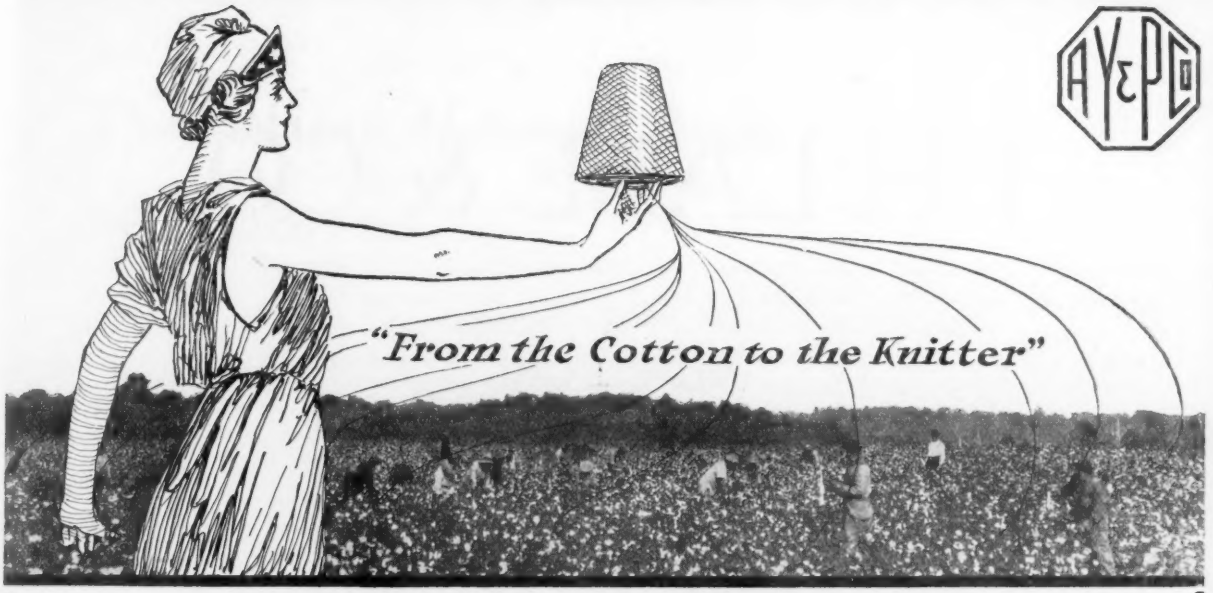

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The Atlanta National Bank
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ON DECEMBER 19, 1865, the Atlanta National Bank received its charter under the National Banking Act in force at that time, and opened its doors for business.

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If you are a customer of either office, and want information or service of any kind from the other cities these wires and the complete organization are at your service.

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100 at $2.50 Single — $4.50 Double, per Day
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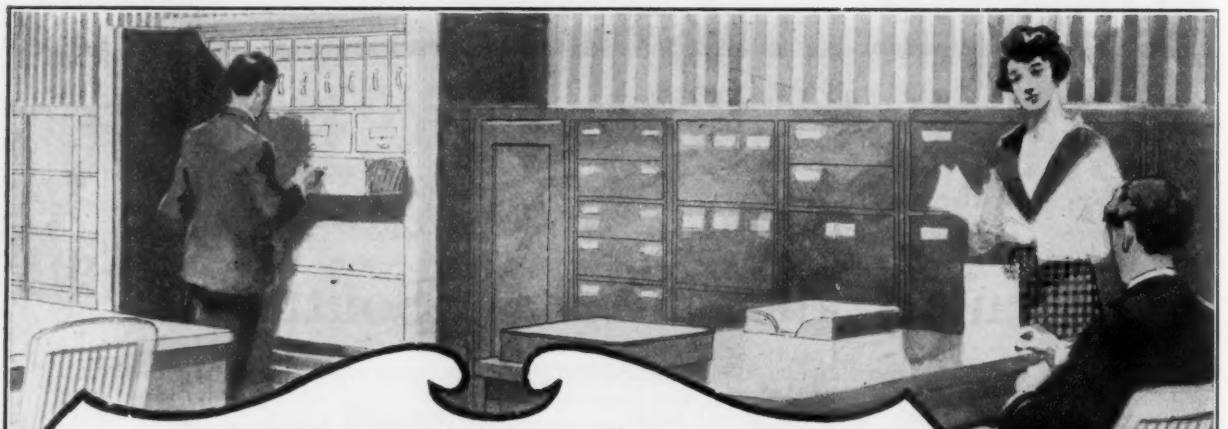

Perhaps we can give you the information

The superintendent of a mill wanted a lot of special corrugated paper boxes. We told him where he could get them.

Another superintendent wanted information as to where he might obtain some 2,000 horsepower of boilers. We gave him the names of several possible sources of supply.

So it goes. This service is free to readers of COTTON. We are always glad to be of assistance in filling your wants. Our files contain the names of manufacturers and dealers in every article or supply you can possibly want.

Let us help you find the things you need. Look first through the advertising pages of COTTON, then if what you want is not advertised write us.

We promise to give you immediate service. We know that we can be of assistance to you.

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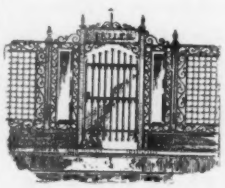

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Place your order now for our KENTUCKY VELVET LUMP and there will be warmth and good cheer in your home.
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Volatile matter	.38	Moisture	1.22
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We handle the Empire, one of the best mines in Alabama. Also steam and mine run coal from Kentucky and Tennessee.

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Advertising conserves the Manufacturer's time by acquainting him with a service or product at his leisure long before the need for such arises.

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WANTED

Second hand looms suitable for weaving No. 0 or No. 1 Duck. State make, price and where they can be seen.

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SPINNING FRAMES WANTED

Six Spinning frames 1¾" ring 2¾" gauge. Prefer frames with 112 spindles to the side equipped with Whitin medium gravity spindles.

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Superintendent of Dyeing, one familiar with Vat, Sulphur, Direct, Developed Colors. Write fully, Age, Experience, etc.

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Corliss Automatic and Slide Valve

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Pumps, Hoisting Engines, Gas and Gasoline Engines.

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THE CHIPMAN KNITTING MILLS OF EASTON, PA.

offer the following machinery for sale, either as a whole or in part. This machinery is all in good condition and now in operation and is being sold for the purpose of giving them more room for their hosiery business.

1—Kitson 2 beater thread waste extractor.
1—Hand feed waste machine composed of 1 Howard & Bullough Beater section and one screen section.
1—1919 Kitson Creighton Opener with 36" bale breaker feed with condenser.
1—Baling press.
1—40" single beater H. & B. Breaker Picker with auto. feed.
1—40" single beater H. & B. Intermediate Picker.
1—40" Howard & Bullough single beater Finisher Picker.
28—40" Howard & Bullough rev. flat cards, 26" doffers, 10" coilers, 120 flats.
7—40 Lowell rev. flat cards, 26" doffers, 10" coilers, 120 flats.
8—Whitin 8 head Combers, making 12" lap.
1—Sliver lap machine, Whitin make.
1—Whitin Ribbon lap machine.
28—del. H. & B. electric stop drawing, arr. 4 del. a head.
8—del. H. & B. metallic roll drawing, arr. 4 del. a head.
2—H. & B. Slubbers, 12 x 6, 48 spindles each.
1—H. & B. Slubber, 10 x 5, 108 spindles, metallic roll
2—H. & B. Intermediate, 10 x 5, 106 Spindles each.
1—H. & B. Intermediate, 10 x 5, 126 Spindles.
6—H. & B. Roving Frames, 8 x 4, 160 Spindles each.
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7—H. & B. Jack Frames, 7 x 3½, 200 Spindles each.
1—City Machine Jack Frame, 7 x 3½, 160 spindles.
6—H. & B. box head spinning frames, 240 spindles each. 3" gauge, 1¾" ring, single boss rolls, 6" trav. metallic threadboards.
24—H. & B. box head spinning frames, 256 spindles each. 2¾" gauge, metallic thread boards, single boss rolls. 16 of them 1½" ring, 8 are 1⅝" ring. These Howard & Bullough machines are all American make.
2—Whitin box head spinning frames, 256 spindles each, 2¾" gauge, metallic thread boards, single boss rolls, 1⅝" ring.
Total 8096 spindles.
1—Culver banding machine.
1—Smith Drum 16 pole skein yarn merc. machine.
3—Klauder-Weldon skein washing machines.
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1—Proctor skein yarn drier.
400—Spindle Lindsey Hyde reels.
500—10" fibre roving cans.
150—Iron lap sticks.
1100—12" bobbins.
4000—10" bobbins.
19500—8" bobbins.
29050—6" bobbins.
45000—ring spinning bobbins.
60—Trucks.

Belting and supplies, all parts on hand for above machinery, including gears, shell rolls, solid rolls, drawing and comber rolls. Also spinning rolls.

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FROM THE GIGANTIC

OLD HICKORY POWDER PLANT

COTTON DRY AND FINISHING HOUSE EQUIPMENT

30 COTTON DRYERS. Maker, Sargent's Sons Corporation. No. 24 six section 8′ cotton dryers. Overall dimensions, 99′4″ long, 15′5″ wide, 7′10″ high. Constructed throughout of metal angles and plates. Equipped with Model "M" self feeder which feeds direct onto 4x4 mesh, No. .092 gauge wire cloth endless belt or apron which extends entire length of dryer. Heating coils located at one side of dryer, 1½″ pipe, to give 15,556 sq. ft. of heating surface. Hot air drawn through belt by 33″ exhaust fans. All fans mounted on tube shafts with double ball bearings. Equipped throughout with automatic sprinkler system.

30 MIXING PICKERS. Maker, Sargent's Sons Corporation. Cylindrical type, 48″ Mixing Pickers. 15 right hand, 15 left hand. Feed apron, heavy leather belt, with maple slats. Equipped with single pair fluted feed rolls, 3½″ diameter. Feed roll bearings held by springs to insure proper tension. Main cylinder built up on heavy cast iron spiders, mounted on 2 7/16″ shaft.
Cylinder provided with 6 heavy steel bars on lugs bolted to spider. Tight and loose driving pulleys 12″ x 6″. Speed 800 to 1.000 R.P.M. Capacity 600 to 800 lbs. per hour. Horsepower required, 4 to 8, according to material handled.

30 COTTON WASHERS. Maker, Sargent's Sons Corporation. 48″ Special cotton washers or rinsers. Right hand and left hand. Complete with cast iron frame, pans, squeeze rolls, kicker and conveyor.

30 FEEDERS. Maker, Sargent's Sons Corporation. 48″ Model "M" feeders for Sargent Dryers.

10 CONCENTRATORS. Maker. Noble & Wood Co. Right hand and left hand cylinder washers with octagon cylinder, diameter 44″ length 42″. Cylinder heads gulf cypress. Buckets 1″ native pine. Cast iron outlet with wide discharge openings. Steel shaft passes through center of outlet and flanged on opposite side. Outlet and flange bolted to beaded cylinder head. Rotates at 6 R.P.M. Vat is 1′4½″ wide, 6′9″ long, 2′9″ high.

WRINGERS.

70 42″ Centrifugal Wringers. Maker, American Tool & Machine Company, Boston, Mass. Complete with 42″ perforated steel basket shell, with steel top, basket 22½″ inside depth, ⅜″ steel. Bottom of basket composed of steel plate riveted to cast iron center, spindle plate, with valve opening. Steel spindle is bolted to plate with three tap bolts. Spindle is connected at top to a special brake and clutch, which is supported on 10″, 1 25 lb. and 10″ channels. Also a 7/16″ shaft and flexible couplings directly connected to a 40 H.P. motor, which drives the wringer. The curb is made of ½″ steel, 50″ inside diameter, 2′6″ deep, with cast iron bottom 12″ deep.

18 Sets, 36″ belt-driven Centrifugal Wringers. Maker, American Tool & Machine Co. Each set arranged in batteries of three. Supporting frames of cast iron, braced with steel rods; curb, bottom and top of cast iron; basket of perforated steel plates. Each wringer is equipped with clutch and driving pulley.

EXTRACTOR.

1 48″ Overdriven Extractor. Maker, American Laundry Machinery Co. Basket made with shell of heavy galvanized boiler steel, perforated, and riveted to brass ring at top and at bottom to heavily galvanized casting, which fits around spindle shaft. Basket reinforced by cast iron bands. Outer curb of cast iron with detachable top or rim supported from frame tripod. Outer curb and inner basket swing free from base on tripod. Base cast in one piece, mounted on rubber bearings. Fitted with tool steel spindle shaft, driving pulleys, upper and lower bearings, brake and countershaft.

In addition, there is available at Old Hickory, power equipment, pumps, engines, machinery pipe, tanks and supplies. The following bulletins covering these items have been prepared and will be sent on request.

Bulletin No. 5, New and Used Belting.
Bulletin No. 7, Steel and Wood Tanks.
Bulletin No. 8, Boilers, Engines, Motors, etc.
Bulletin No. 9, Miscellaneous Equipment.
Bulletin No. 10, Pumps of All Kinds.
Bulletin No. 11, Blowers and Exhaust Fans.
Bulletin No. 12, Industrial Railway Equipment.
Bulletin No. 13, Hardware and Supplies.
Bulletin No. 14, Chemical Ware and Technical Machinery.

It is suggested that purchasing agents or plant superintendents be sent to Old Hickory to look over the supply of surplus materials and equipment, and inspect the articles in which they may be interested. Old Hickory is 12 miles from Nashville, Tenn, and can be reached by interurban cars or by automobile jitney busses, which run at frequent intervals. There are good hotel accommodations at Old Hickory, and it is advised that interested parties spend several days looking over the immense stocks at this place.

NASHVILLE INDUSTRIAL CORPORATION

JACKSONVILLE, TENN.

Buyers' Index

Acetylene Gas.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

Acetylene Welding Apparatus.
(See Welding Apparatus).

Accountants.
(See Auditors and Accountants).

Air Washers.
Bayley Mfg. Co.
Carrier Eng. Corp.
Parks-Cramer Co.

Air Conditioning Systems.
(See Humidifying Apparatus).

Albone.
Roessler & Hasslacher Chemical Co.

Alkalies.
(See Dyestuffs and Chemicals).

Aniline Colors.
(See Dystuffs and Chemicals).

Anti-Chlornis.
(See Dyestuffs and Chemicals).

Appraisal Service
American Appraisal Co.

Aprons-Rub.
Smith & Furbush Machine Co.

Architects and Engineers.
Lockwood, Greene & Co.
Robert & Co.
Spiker & Lose.
Sirrine, J. E.
Stuhrman Edw. A.
Thompson & Binger, Inc.

Ash Handling Machinery.
(See Coal Handling Machinery).

Asphalt Slate Shingles.
(See Slate Asphalt Roofing).

Auditors and Accountants.
American Audit Co.
Ernst & Ernst.

Auto Trucks.
(See Trucks—Auto).

Automatic Controllers (Temperature).
(See Temperature Controllers.)

Automatic Loom Attachments.
(See Loom Attachments).

Automatic Feeds for Cotton.
Proctor & Schwartz, Inc.
Saco Lowell Shops.
Sargent's Sons Corp., C. G.
Smith & Furbush Mch. Co.
Whitin Mch. Works.

Automatic Guider (Electric).
Blake Electric Mfg. Co.

Backwashers.
Sargent's Sons Corp., C. G.

Automatic Scales.
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Ball Bearings.
Aldrich Mch. Works.
Fafnir Bearing Co.
Hyatt Roller Bearing Co
Skayef Ball Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.

Ball Bearing Housings.
Aldrich Mch. Works.
Fafnir Bearing Co.
U. S. Ball Bearing Co.

Bale Band Buckles.
(See Box Strapping & Buckles).

Baling Machines.
Crompton & Knowles Loom Wks.
Draper Corporation.
Economy Baler Co.
Famous Mfg. Co.
Galland-Henning Mfg. Co.
Saco-Lowell Shops.

Baling Presses.
(See Presses).

Bandages, Tapes, Etc.
American Textile Banding Co.

Bands.
(See Tapes).

Banks.
Atlanta National Bank.
Citizens & Southern Bank.
National Shawmut Bank.
Textile Banking Co.

Barrels—Fibre.
(See Fibre Products).

Baskets—Mill.
(See Boxes—Mill).

Bath Cabinet—Shower.
Crane Co.
Manufacturing Equipment & Engineering Co.
Sanymetal Products Co.

Batteries (Elec.).
(See Storage Batteries).

Beams.
Mossberg Pressed Steel Corp.
Walraven Co.

Beam Dyeing Machines.
Cocker Mchry. & Foundry Co.

Beam Heads.
Mossberg Pressed Steel Corp.
Walraven Co.

Beaming and Warping Mchry.
(See Warpers and Warping Machinery).

Bearings.
Cresson-Morris Co.
Diamond State Fibre Co.
Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Skayef Ball Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.
Wood's Sons Co., T. B.

Belting (Leather, Canvas & Rubber
American Supply Co.
Fabreeka Belting Co.
Skinner & Co., Inc., R. D.
Walraven Co.
Williams & Sons, I. B.

Belting—Chain Link.
Link-Belt Company.
Morse Chain Co.

Belting—Rope.
(See Rope Transmission).

Belt Conveyors.
Brown Co., A. & F.
Dodge Sales & Eng. Co.
Link-Belt Company.
Morse Chain Co.

Belt Dressing.
Dixon Crucible Co., Jos.
Skinner & Co., Inc., R. D.
Walraven Co.
Williams & Co., I. B.

Belt Fasteners.
Columbia Novelty Mfg. Co.
Flexible Steel Lacing Co.

Belt Lacing.
Fabreeka Belting Co.
Columbia Novelty Mfg. Co.
Flexible Steel Lacing Co.
Skinner & Co., Inc., R. D.
Walraven Co.
Williams & Sons, I. B.

Belt Tighteners.
Brown Co., A. & F.
Link-Belt Company
Wood's Sons Co., T. B.

Bench Drawers.
Lupton's Sons. Co., David

Bench Legs (Pressed Steel).
Lupton's Sons, Co., David.

Benches (Park and Playground).
(See Playground Equipment).

Bleacheries.
(See Dyers, Bleachers and Finishers).

Bleaching Kiers.
Butterworth & Sons Co., H. W.
Hauser-Stander Tank Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machinery Co., The.

Bleaching Machinery.
(See Dyeing, Bleaching and Finishing Machinery).

Bleaching, Finishing and Sizing Materials.
(See Finishing Materials).

Blowers and Blower Systems.
Bayley Mfg. Co
Carlisle & Gale Co.
Carrier Eng. Corp.
Clements Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Boards—Fibre.
Diamond State Fibre Co.

Boards—Form.
Pearson, Jos. T.

Board Panels for Walls & Ceilings.
Cornell Wood Products Co.

Bobbins.
Draper Corporation.
Jordan Mfg. Co.
Shambow Shuttle Co.
Vermont Spool & Bobbin Co.
Walraven Co.
Whitin Machine Works.

Bobbin Heads.
Diamond State Fibre Co.

Boilers.
International Engineering Works, Inc.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Schofield's Co., J. S.
Toomey, Frank.
Walsh & Weidner Boiler Co.

Boiler Compounds
Dixon Crucible Co., Jos.

Boiler Feed Water Purification.
American Water Softener Co.
Norwood Engineering Co.
Permutit Co.
Scaife & Sons, Wm. B.

Boiler Room Fittings & Supplies.
Crane Co.
Dixon Crucible Co., Jos.
International Engineering Co.
Lunkenheimer Co.
Nashville Industrial Corp.

Boiler Grates and Stokers.
(See Grates and Stokers).

Box Strapping and Tie Buckles.
(See Banding Straps & Buckles).

Boxes—Mill.
Diamond State Fibre Co.
Hightower Box & Tank Co.
Lane & Bros., W. T.
Lewis Co., G. B.
Standard Fibre Co.
Walke Box Co.

Boxes—Packing.
(See Packing Boxes).

Braid.
(See Tapes).

Brake Linings.
Diamond State Fibre Co.

Brazing.
(See Welding).

Brokers—Cotton.
(See Cotton Dealers & Brokers).

Brokers—Stock.
(See Stocks and Bonds).

Brooms.
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Brushes—Mill.
Atlanta Brush Co.
Harris Broom Co.
Southwestern Broom Mfg. Co.

Brushes—Motor and Generator (Commutator).
Dixon Crucible Co., Jos.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Buckets and Pails—Mill.
Diamond State Fibre Co
Standard Fibre Co.

Buckets—Elevator and Grab.
Link-Belt Company.

Buckles—Cotton Tie.
(See Box Strapping and Ties)

Building Contractors.
(See Contractors).

Building Material.
American Roofing & Paint Co.
Anchor Post Iron Works.
Barrett Co., The.
Birmingham Slag Co.
Carlisle & Gale Co.
Cornell Wood Products Co.
Drouve Co., G.
Dufur & Co.
Lockwood, Green & Co.
Lupton's Sons Co., David
Sanymetal Products Co.
Southern Cypress Mfg. Asso.

Bungalows.
(See Houses—Ready Built).

Burr Pickers.
Sargent's Sons, C. G.
Smith & Furbush Machine Co.

Bushings.
Brown Co., A. & F.
Diamond State Fibre Co.
Dodge Sales & Eng. Co.
Southern Spindle & Flyer Co.
Shambow Shuttle Co.
Walraven Co.

Cabinets.
(See Lockers).

Calenders.
Butterworth & Sons Co., H. W.
Textile Finishing Machinery Co.

Calender Rolls.
Campbell Mfg. Co.
Butterworth & Sons Co., H. W.
Roy & Son, B. S.
Textile Finishing Machinery Co.

Calling System—Inter-Telephone.
Bryan Electric Co.
Carter Electric Co.

Cans—Roving.
Diamond State Fibre Co.
Standard Fibre Co.

Cars and Trucks—Fibre.
(See Trucks).

Carbonizing Machines.
Cocker Mch. & Fdry Co.
Klauder-Weldon Dyeing Mch. Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Machinery Co., The.
Tolhurst Mch. Wks.

Carding Machinery and Supplies.
Howard Bros. Mfg. Co.
Howard & Bullough.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Southern Spindle & Flyer Co.
Whitin Machine Works.

Card Clothing.
Howard Bros. Mfg. Co.
Howard & Bullough.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

Card Feeds.
Schofield, Wm. Co.
Smith & Furbush Mach. Co.
Whitin Machine Co.

Card Grinding Machinery.
Roy & Son Co., B. S.
Smith & Furbush Mach. Co.
Whitin Machine Works.

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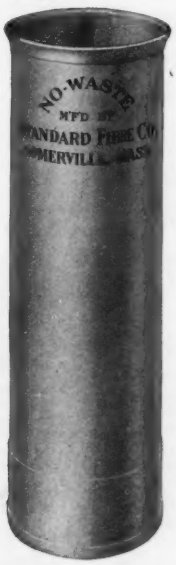

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—o—

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NEW PATTERN
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—o—

Combination
Doffing Cars

—o—

STANDARD FIBRE CO.

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Somerville, Massachusetts

BUYERS' INDEX—Continued.

Carpet Machinery.
Butterworth, H. W., & Sons Co.
Crompton & Knowles Loom Wks.
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Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

Carrier Aprons.
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Carrier System.
Curtis Pneumatic Machinery Co.
Richards-Wilcox Mfg. Co.

Cases—Wooden.
(See Boxes).

Casement Window Hardware.
Richards-Wilcox Mfg. Co.

Castings.
Cresson-Morris Co.
Lombard Foundry & Mch. Co.
Walsh & Weidner Boiler Co.

Caustic Soda.
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Ceilings (Wood Panel.)
Cornell Wood Products Co.

Cement Reinforcement.
Birmingham Slag Co.

Cement and Brick Coating.
American Cement Paint Co.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Niles Co., Wm. J.
Wadsworth Howland & Co., Inc.

Central Station (Electric).
Georgia Railway & Power Co.

Centrifugals.
Cresson-Morris Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Mch. Wks.

Chain Drives.
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Chain—Block, Bicycle, Auto, Engine, Agricultural, Etc.)
Morse Chain Co.

Chairs and Stools.
Manufacturing Equipment & Engineering Co.
Southern Theatre Equipment Co.

Chemicals.
(See Dyestuffs and Chemicals).

Chlorine Gas.
Electro Bleaching Gas Co.

Cleaning Machine—Blower.
Clements Mfg. Co.

Cleaner Cloth.
Philadelphia Felt Co.

Clocks—Hank, Etc.
(See Counters).

Clocks—Watchman.
Chicago Watchman Clock Co.

Closets—Water.
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Cloth—Roller, Clearer Slasher.
Philadelphia Felt Co.

Cloth Cutters.
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Wildman Mfg. Co.

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Blake Electric Mfg. Co.

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Reliance Machine Works.
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Carlyle-Johnson Machine Co.
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Link-Belt Company.
Wood's Sons Co., T. B.

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Diamond State Fibre Co.

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Truitt Coal & Iron Co.

Coal & Ash Handling Machinery.
Link-Belt Company.

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General Electric Co.
Goulds Mfg. Co.
Walraven Co., The.

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Birmingham Slag Co.

Condensers.
Allis-Chalmers Mfg. Co.

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Connectors—Frankel Solderless.
Westinghouse Elec. & Mfg. Co.

Consulting Engineers.
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Contractors and Engineers—Building.
Foundation Co.
Sirrine & Co. J. E.
Spiker & Lose.
Stuhrman, Edw. A.
Thompson & Binger, Inc.
Tufts Co., Arthur.

Contractors—Electrical.
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Contractors—Painting.
American Roofing & Paint Co.

Contractors (Roofing.)
American Roofing & Paint Co.

Controlling Instruments—Temperature.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

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Link-Belt Co
Morse Chain Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
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Schofield, Wm. Co.
Walraven Co.

Conveyors—Portable.
Dowman, George

Coolers.
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Coolers—Water.
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Cooling and Conditioning Machines.
Manufacturers Machine Co.

Cooling Towers.
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Cordage Machinery.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

Cotton Yarn and Cloth Commission Merchants and Dealers.
Amoskeag Mfg. Co.
Bliss, Fabyan & Co.
Boger & Crawford.
Carver-Beaver Yarn Co., Inc.
Fawcett, Hughes.
Florsheim, H. A.
Hunter Mfg. & Comm. Co.
Lane & Co., J. H.
Pacific Mills.
Tolar & Hart.
Weimar Bros.
Wellington Sears & Co.
Woodward Baldwin & Co.

Cotton Merchants and Brokers.
Beer, H. & B.

Cotton Mill machinery and Supplies.
Barber-Colman Co.
Blake Electric Mfg. Co.
Boston Machine Works Co.
Butterworth & Sons, H. W.
Cocker Mach. & Foundry Co.
Crompton & Knowles Loom Wks.
Draper Corporation.
Durant Mfg. Co.
Eclipse Textile Devices, Inc.
Firsching, J. A.
Fletcher Works.
Foxboro Co., Inc.
Gallaudet Aircraft Corp.
Greist Mfg. Co.
Hopedale Mfg. Co.
Howard Bros. Mfg. Co.
Howard & Bullough.
Lestershire Spool & Mfg. Co.
Manufacturers Machine Co.
Mossberg Pressed Steel Corp.
Phila. Drying Mchry. Co.
Philadelphia Felt Co.
Proctor & Schwartz, Inc.
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Saco-Lowell Shops.
Schaum & Uhlinger.
Schofield Co., Wm.
Shambow Shuttle Co.
Slaughter Mchry. Co., G. G.
Smith & Furbush Mach. Co.
Southern Bending Co.
Stafford & Co.
Steel Heddle Mfg. Co.
Terrell Machine Co.
Textile Fininshing Machinery Co.
Textile Service & Equip. Co.
Textile Specialty Co.
Tolhurst Mch. Wks.
Universal Winding Co.
Vermont Spool & Bobbin Co.
Walraven Co.
Warp Compressing Mch. Co.
Whitin Machine Works.
Whitinsville Spinning Ring Co.

Cotton Storage.
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Cotton Tape Loom.
Fletcher Works.
Schaum & Uhlinger.

Cotton Yarn Mills.
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Counters—Revolution, Hank, Pick, Etc.
Boston Machine Works.
Durant Mfg. Co.
Slaughter, G. G.

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Cresson-Morris Co.
Wood's Sons Co., T. B.

Covers—Rollers.
Diamond State Fibre Co.

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Cutters—Cloth.
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Cypress Lumber.
Southern Cypress Mfg. Asso.

Cutters—Thread.
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Diamond State Fibre Co.

Disinfectants.
Barrett Co., The
Sanitas Co.

Dobby Chains.
Crompton & Knowles Loom Wks.
Whitin Machine Works.

Doffing Boxes—Mill.
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Doffing Cars.
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Door Closers and Checks.
Richards-Wilcox Mfg. Co.

Doors & Elevator Enclosures.
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Door Hangers.
Dowman, George.
Richards-Wilcox Mfg. Co.

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Lupton's Sons Co., David

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Saco-Lowell Shops.
Whitin Machine Works.

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Drinking Fountains.
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Drop Wires.
Greist Mfg. Co.
Mossberg Pressed Steel Corp.
Steel Heddle Mfg. Co.

Drying Apparatus.
Bayley Mfg. Co.

Drying Forms—Hosiery.
Pearson, Jos. T.

Drying Machinery.
American Laundry Mchry. Co.
Butterworth, H. W., & Sons Co.
Proctor & Schwartz, Inc.
Sargent's Sons Corp., C. G.
Textile Finishing Machinery Co., The.
Tolhurst Machine Works.

Dust Collectors.
(See Blowers and Blowing Systems).

Dusting Machinery.
Schofield Co., Wm.
Smith & Furbush Mach. Co.

Dyers, Bleachers and Finishers.
American Yarn & Processing Co
Boger & Crawford.
Dixie Mercerizing Co.
Franklin Process Co
United Piece Dye Wks.

Dyeing, Bleaching, Finishing and Printing Machinery and Equipment
American Laundry Mchry. Co.
Butterworth & Sons Co., H. W.
Cocker Mch. & Foundry Co.
East Jersey Pipe Co.
Electro Bleaching Gas Co.
Firsching, J. A.
Fletcher Works.
Franklin Process Co.
Hauser-Stander Tank Co.
Klauder-Weldon Dyeing Mch. Co.
Manufacturers Machine Co.
Permutit Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Schaum & Uhlinger.
Textile Finishing Machinery Co. The.
Tolhurst Machine Works.

Dyeing Machines (Package and Spool.)
Franklin Process Co.

Dye Sticks.
Phila. Drying Machinery Co.

Dyestuffs and Chemicals.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Barrett Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Electro Bleaching Gas Co.
Ford Co., J. B.
Grasselli Chemical Co.
India Alkali Works.
Kali Mfg. Co.
Klipstein & Co., A.
Lewis, John D.
Metz & Co., H. A.
Mathieson Alkali Works, Inc.
National Aniline & Chemical Co.
Newport Chemical Works, Inc.
Roessler & Hasslacher Chemical Co.
Sandoz Chemical Co.
Sonneborn Sons Co., Inc., L.
Staley Mfg. Co., A. E.
Surpass Chemical Co.
United Chemical Products Corp.
Wolf & Co., Jacques.

Elastic Stockings.
Estes Surgical Supply Co.
Perryman-Burson Co.

Electric Conduit & Fittings
(See Electrical Machry. & Supplies.)

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Electric Dynamos and Motors.
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Electric Lamps.
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Electric Lamp Guards.
Bryan Electric Co.
Flexible Steel Lacing Co.

Electrical Engineers and Contractors.
Huntington & Guerry, Inc.

Electrical Machinery and Supplies.
Allis-Chalmers Mfg. Co.
Bayley Mfg. Co.
Blake Electric Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Cutter Works, George.
General Electric Co.
Slaughter Mchry. Co., G. G.
Walraven Co., The.
Walsh & Weidner Boiler Co.
Westinghouse Elec. & Mfg. Co.

Electric Tractors and Trucks.
(See Tractors & Trucks—Elec).

Elevators—Portable.
Collins, J. D.

Elevators.
Link-Belt Company.

Emergency Supplies for First Aid Rooms.
Estes Surgical Supply Co.
Perryman-Burson Co.

Enamel—Mill White.
(See Paint).

Engineers—Mill.
(See Architects).

Engines—Oil, Gas and Gasoline.
Allis-Chalmers Mfg. Co.
Walraven Co., The.

Engines—Steam.
Allis-Chalmers Mfg. Co.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Schofield's Sons Co., J. S.
Toomey, Frank.

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Crane Co.
Lunkenheimer Co.
Nashville Industrial Corp.
Slaughter Mchry. Co., G. G.
Walraven Co.
Westinghouse Electric & Mfg. Co.

Exporters—Cotton.
(See Brokers).

Extractors—Hydro.
American Laundry Mchry. Co.
East Jersey Pipe Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Machine Works.

Fans—Electric.
Bayley Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Fans—Conveying, Power and Exhaust.
(See Blowers and Blowing Systems).

Fasteners—Belt.
(See Belt Fasteners).

Feed Water Purifiers.
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Felt Cloth for Rolls.
Philadelphia Felt Co.

Felting Machinery.
Smith & Furbush Mch. Co.

Fence—Steel and Iron.
Anchor Post Iron Wks.
Cyclone Fence Co.

Fibre Products.
Diamond State Fibre Co.
Standard Fibre Co.

Fillets (Calender and Doffer, Strippers, Burnishing and Emery.)
Howard Bros. Mfg. Co.

Films (Motion Picture).
Brombery Attractions, Arthur C.
Federated Films of Atlanta,
Savini Films, Inc., R. M.
Southern States Film Co.

Filters—Water.
American Water Softener Co.
Norwood Engineering Co.
Permutit Co.
Scaife & Sons Co., Wm. B.

Filters—Oil Removal.
Norwood Engineering Co.
Permutit Co.

Filters—Sand.
Permutit Co.

Finishing.
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Finishing, Bleaching and Sizing Materials.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Barrett Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Corn Products Refining Co.
Du Pont de Nemours & Co., E. I.
Electro Bleaching Gas Co
Electric Smelting & Alluminum Co.
Ford Co., J. B.
India Alkali Works.
Kali Mfg. Co.
Keever Starch Co.
Klipstein & Co., A.
Mathieson Alkali Works, Inc.
Metz & Co., H. A.
Moore Oil Refining Co.
National Aniline & Chemical Co.
Newport Chemical Works.
Roessler & Hasslacher Co.
Sandoz Chemical Co.
Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stearns, Wm. Taylor.
United Chemical Products Corp.
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Wolf & Co., Jacques.

Fire Doors and Hardware.
Fire Protection & Const. Co.
Richards-Wilcox Mfg. Co
Sanymetal Products Co.
Vonnegut Hardware Co.

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Fire Protection & Const. Co.

Fire Hose.
(See Hose—Fire).

Fire Protecting Paint.
(See Paint).

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Perryman-Burson Co.

Flexible Couplings.
Allis-Chalmers Mfg. Co.
Cresson-Morris Co.

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General Electric Co.

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Hightower Box & Tank Co.
Southern Cypress Mfg. Co.

Floor Scrubbing Machine.
American Scrubbing Equip. Co

Floor Scrubbing Powders.
India Alkali Works.

Floor Sweeps.
See Brushes.

Fluted Rolls.
Howard & Bullough.
Saco-Lowell Shops.
Schofield & Sons, J. S.
Smith & Furbush Mach. Co.
Southern Spindle & Flyer Co
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Flyers.
Howard & Bullough.
Saco-Lowell Shops.
Southern Spindle & Flyer Co
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Cresson-Morris Co.
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Crane Co.
Manufacturing Equipment & Engineering Co.
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Puro Sanitary Drinking Fountain Co.
Rundle-Spence Mfg. Co
Taylor, Halsey W.
Twentieth Century Brass Works.

Friction Clutches.
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Fuses.
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Garage Doors and Door Hardware.
Richards-Wilcox Mfg. Co.

Garnett Machines.
Roy & Son Co., B. S.
Smith & Furbush Mach. Co.

Gas Engines.
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Gaskets.
Diamond State Fibre Co.

Gauges (Steam Pressure, Etc.)
Foxboro Co., Inc.

Gauge Cocks.
Lunkenheimer Co.

Gauge—Oil.
Brown Co., A. & F.
Lunkenheimer Co.

Gauges—Water.
Lunkenheimer Co.

Gears—Silent.
Brown Co., A. & F.
Diamond State Fibre Co.
General Electric Co.
Link-Belt Company.
Morse Chain Co.

Gear Cutting and Cutters.
Brown Co., A. & F.
Cresson-Morris Co.
Whitin Machine Co., D. E

Gear Pullers.
General Electric Co.

Generators—Electric.
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Glassware and Dishes.
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Glass Skylights.
Drouve Co., G.

Governors—Pump.
General Electric Co.

Graphite.
Dixon Crucible Co., Jos.

Grates—Boiler.
International Eng. Works.
Lombard Fdry. & Mch. Co.
Walsh & Weidner Boiler Co.

Grates—Mechanical.
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Grease.
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Grease Cups.
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Grindstones.
Richards-Wilcox Mfg. Co.

Grinders—Card. Cylinder, Roll, Napper and Garnet.
(See Card Grinding Machinery).

Guards—Electric Lamp.
Bryan Electric Co.
Flexible Steel Lacing Co.

Guides—Thread.
Palmer Co., I. E.

Guider (Cloth-Electric.)
Blake Electric Mfg. Co.

Gums.
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Hangers.
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Hardware (Building.)
Richards-Wilcox Mfg. Co.
Sanymetal Products Co.
Vonnegut Hardware Co.

Harness—Loom.
American Supply Co.
Crompton & Knowles Loom Wks.
Emmons Loom Harness Co.
Greist Mfg. Co.
Garland Mfg. Co.

Heads—Bobbin and Spool.
Diamond State Fibre Co.

Heaters.
Bayley Mfg. Co.

Heating and Ventilating Apparatus.
(See Ventilating Apparatus).

Heddles.
Crompton & Knowles Loom Wks.
Draper Corporation.
Howard Bros. Mfg. Co.
Steel Heddle Mfg. Co.

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Crompton & Knowles Loom Wks.
Steel Heddle Mfg. Co.

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Curtis Pneumatic Mchry. Co.
Link-Belt Company.
Morse Chain Co.
Richards-Wilcox Mfg. Co.
Walraven Co.

Hose—Fire.
Collins, J. D.
Fire Protection & Const. Co.
Walraven Co.

Hosiery Dyeing Machinery.
Cocker Mach. & Fdry. Co.
Franklin Process Co.

Hosiery Forms.
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Hosiery Yarns.
(See Yarn Manufacturers).

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Powers Regulator Co.

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(See Turbines—Hydraulic).

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(See Extractors).

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Durant Mfg. Co.
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(See Dyestuffs and Chemicals).

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Lunkenheimer Co.

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Diamond State Fibre Co.

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Atlanta Stamp & Stencil Works.
Bradley Mfg. Co., A. J.

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Cyclone Fence Co.
Dufur & Co.
Lombard Iron Works & Supply Co.

Jack Spools.
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Jacquards.
Crompton & Knowles Loom Wks.

Joint Compound.
Dixon Crucible Co., Jos.

Jute Bagging Machine.
Smith & Furbush Machine Co.

Kettles—Size.
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Kettles—Soda.
Lombard Iron Works & Sup. Co.

Kiers.
(See Bleacher Kiers).

Knit Goods.
(See Cotton Cloth Commission Merchants and Dealers).

Knit Goods Washers.
(See Washers—Cloth).

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Brinton Co., H.
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(See Belt Lacing).

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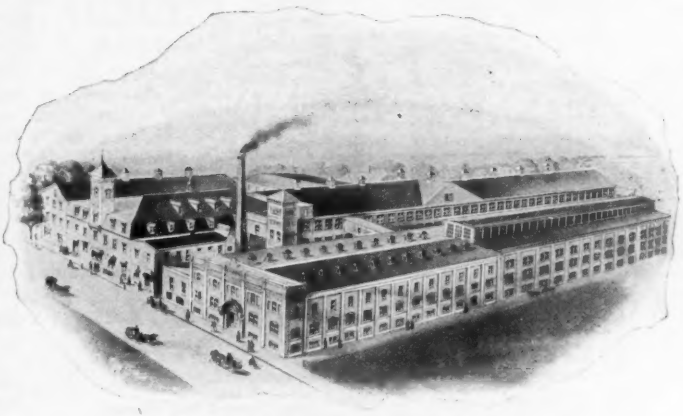

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Bryan Electric Co.
Carter Electric Co.
Cutter Works, George.
Westinghouse Elec. & Mfg. Co.

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Lappers.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Whitin Machine Works.

Latches (Fire Exit Self-Releasing.)
Vonnegut Hardware Co.

Laundry Machinery.
American Laundry Mach'y Co.
Fletcher Works.
Schaum & Uhlinger.
Telhurst Machine Works.

Lavatories.
Crane Co.
Manufacturing Equipment & Engineering Co.
Vogel Co., Jos. A.

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Leather Specialties.
American Supply Co.
Williams & Sons, I. B.

Lights—Flood.
Cutter Works, George.
General Electric Co.
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Linen Yarns.
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Link Belting.
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Linters.
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Loaders—Wagon and Truck.
Link-Belt Company.

Locks and Latches.
Richards-Wilcox Mfg. Co.

Lockers—Metal.
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Sanymetal Products Co.

Logwood Extract.
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Looms.
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Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.
Warp Compressing Mch. Co.

Looms (Cord Fabric.)
Warp Compressing Mch. Co.

Loom Attachments—Automatic.
Draper Corporation.
Hopedale Mfg. Co.

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Lubricants.
D-A Lubricant Co.
Dixon Crucible Co., Jos.
Masury Young Co.
Moore Oil Refining Co.
N. Y. & N. J. Lubricant Co.
Swan & Finch Co.

Lubricators.
Lidseen
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

Lug Straps.
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Lumber.
Cornell Wood Product Co.
Southern Cypress Mfg. Asso.

Lunch Room Equipment.
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Machinists.
Cresson-Morris Co.

Marking Machines.
Markem Machine Co.

Marking Pots, Stencils, Inks, Etc.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

Mercerized Yarns.
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Mercerizers.
Amer. Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.
United Piece Dye Wks.

Mercerizing Machinery.
Butterworth, H. W. & Sons Co.
Textile Finishing Machinery Co.

Metal Ceilings, Etc.
Lupton's Sons Co., David.

Metals—Perforated.
(See Screens and Sieves).

Metal Workers—Sheet.
Lombard Iron Works & Supply Co.

Meters—Flow, Air, Gas, Electric Steam, Etc.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Meters (Counting.)
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Mill Baskets and Boxes.
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Mill Engineer.
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Mill Villages.
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Mill Supplies—Miscellaneous.
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Mill White Paint.
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Monorail Conveying Systems.
Richards-Wilcox Mfg. Co.

Mops.
Atlanta Brush Co.
Harris Broom Co.
Southwestern Broom Mfg. Co

Motion Pictures
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Motors and Generators—Electric.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
General Electric Co.
Nashville Industrial Corp.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.

Musical Instruments & Supplies.
Cable Piano Co.

Moving Picture Mch. & Supplies.
(See Theatre Equipment).

Nappers.
Roy & Son Co., B. S.

Napper Clothing.
Howard Bros. Mfg. Co.

Office Partitions.
Sanymetal Products Co.

Oil (Lubricating.)
D-A Lubricant Co.
Johnson & Co., Inc., Oliver.
Masury-Young Co.
Moore Oil Refining Co.
Wadsworth, Howland & Co., Inc.

Oils—Finishing.
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Oil Cans.
Lidseen

Oil Cups.
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Oil Paper.
Bradley Mfg. Co., A. J.

Oiling Devices.
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Openers for Cotton, Wool, Waste, Etc.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

Overhead Carriers.
Curtis Pneumatic Mchry. Co.
Richards-Wilcox Mfg. Co.

Oxidizing Machinery.
Cocker Mch. & Fdry. Co
Phila. Drying Machinery Co.

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Commercial Acetylene Supply Co.
Oxweld Acetylene Co
Standard Gas Products Co.

Packing Boxes & Cases—Wooden.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lewis Co., G. B.
Walke Box Co., Inc.

Packings.
Augusta Mill Supply Co.
Walraven Co.

Paint.
American Cement Paint Co.
American Rooting & Paint Co.
Barrett Co., The.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Niles Co., Wm. J.
Patterson-Sargent Co.
Wadsworth, Howland & Co., Inc.

Painting Contractors.
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Panel Boards.
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Paper.
Bradley Mfg. Co., A. J.
Diamond State Fibre Co.

Partitions (Office and Toilet).
Sanymetal Products Co.

Perforated Metal.
(See Screens and Sieves).

Partitions—Steel.
Lupton's Sons Co., David
Sanymetal Products Co.

Peroxides.
Roessler & Hasslacher Chemical Co.

Piano & Players.
Cable Piano Co.

Pickers—Curled Hair.
Schofield Co., Wm.
Smith & Furbush Mach. Co.

Pickers—Leather.
Garland Mfg. Co.

Picker Sticks.
Garland Mfg. Co.
Southern Bending Co.
Shambow Shuttle Co.
Walraven Co.

Picking Machinery.
Howard & Bullough, Am. Machine Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

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Diamond State Fibre Co.
General Electric Co.

Pipe and Pipe Fittings.
Crane Co.
East Jersey Pipe Co.
Fire Protection & Const. Co.
Lunkenheimer Co.
Parks-Cramer Co.
Scaife & Sons Co., Wm. B.
Walraven Co.

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Dixon Crucible Co., Jos.

Pipe Threading and Cutting Machines.
Walraven Co., The.

Playground Apparatus Equipment.
Crane Co.
Manufacturing Equipment & Engineering Co.
Puro Sanitary Drinking Fountain Co.
Taylor, Halsey W.
Twentieth Century Brass Works.

Pneumatic Machinery & Tools.
Curtis Pneumatic Mchry. Co.

Portable Conveyors.
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Power (Electric.)
Georgia Railway & Power Co.

Power Transmission.
Aldrich Mach. Works.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Carlyle-Johnson Mch. Co
Columbia Novelty Mfg. Co.
Cresson-Morris Co.
Dixon Crucible Co., Jos.
Fabreeka Belting Co.
Fafnir Bearing Co.
Flexible Steel Lacing Co.
General Electric Co.
Hyatt Roller Bearing Co.
Link-Belt Company.
Manufacturing Equipment & Engineering Co.
Morse Chain Co.
Skayef Ball Bearing Co.
Skinner & Co., Inc., R. D.
Slaughter Mchry. Co., G. W.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.
Williams & Sons, I. B.
Wood's Sons Co., T. B.

Preservative Paints for Metal Wks.
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Pressed Steel.
Lupton's Sons Co., David.

Presses.
American Laundry Mchry. Co.
Butterworth & Sons Co., H. W.
Economy Baler Co.
Famous Mfg. Co.
Galland-Henning Mfg. Co.
Phila. Drying Mch. Co.
Proctor & Schwartz, Inc.
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Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

Printing.
Byrd Printing Co.
Dowman Wilkins Printing Co.
Richards Printing Co., J. B.
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Pulleys.
Brown Co., A. & F.
Dodge Sales & Eng. Co.
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Diamond State Fibre Co.
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Walraven Co., The.
Wood's Sons Co., T. B.

Pulley Covering.
Williams & Sons, I. B.

Pumps.
Allis-Chalmers Mfg. Co.
Goulds Mfg. Co
Sydnor Pump & Well Co., Inc.
Toomey, Frank.
Walraven Co.
Walsh & Weidner Boiler Co., The.
Westinghouse Elec. & Mfg. Co.

Pump Valves.
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Quill Cleaning Machines.
Terrell Machine Co.

Receptacles—Fibre.
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Recording Instruments.
Boston Machine Works.
Durant Mfg. Co.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

Reeds.
American Supply Co.
Emmons Loom Harness Co.
Shambow Shuttle Co.
Walraven Co.

Reels.
Cocker Mch. & Fdry. Co.
Crompton & Knowles Loom Wks.
Draper Corporation.
Gallaudet Aircraft Corp.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

Reflectors—Lamp.
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Regulators—Liquid Level.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

Regulators—Pressure.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

Regulators—Temperature.
(See Temperature Controllers).

Reinforcing Slag.
Birmingham Slag Co.

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Bryan Electric Co.
Westinghouse Elec. & Mfg. Co.

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Whitinsville Spinning Ring Co.
Whitin Machine Works.

Rings—Spinning.
(See Spinning Rings).

Rocker Shaft Bearings.
(See Bearings).

Rolls—Calender.
Butterworth & Sons Co., H. W.
Roy & Son Co., B. S.
Textile Finishing Machinery Co.

Rolls—Rubber Covered.
Butterworth & Sons Co., H. W.
Textile Finishing Machinery Co.

Rolls—Steel.
Butterworth & Sons Co., H. W.
Southern Spindle & Flyer Co.
Textile Finishing Machinery Co.

Roller Cloth.
Philadelphia Felt Co.

Roofing.
American Roofing & Paint Co.
Barrett Co., The.
Cortright Metal Roofing Co.
Wadsworth, Howland & Co.
Walraven Co.

Roof Anchors.
Fire Protection & Const. Co.

Roof and Cement Coating.
American Roofing & Paint Co.
Barrett Co.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co.

Rope—Transmission.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Link-Belt Company.
Walraven Co.

Rope Sheaves.
Brown Co., A. & F.

Roving Machinery.
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

Rubber Goods.
Estes Surgical Supply Co.
Perryman-Burson Co.

Rubber Stamps.
(See Stamps, Stencils, Etc)

Salamanders
Drouve Co., G.

Sanitary Products.
Crane Co.
Estes Surgical Supply Co.
Manufacturing Equipment & Engineering Co.
Perryman-Burson Co.
Puro Sanitary Drinking Fountain Co.
Rundle-Spence Mfg. Co.
Sanitas Co.
Taylor, Halsey W.
Twentieth Century Brass Mfg. Co.
Vogel Co., Jos. A.

Sash-Window—Steel.
Drouve Co., G.
Lupton's Sons Co., David.

Sash Operator
Drouve Co., G.

Scale Preventer—Boiler.
(See Boiler Feed Water Purification).

Screens (Moving Picture).
Monarch Theatre Supply Co
Southern Theatre Equipment Co.

Screens and Sieves—Perforated.
Allis-Chalmers Mfg. Co.
Erdle Perforating Co.
Link-Belt Company.

Scouring Machinery.
(See Washers (Cloth)

Scrubbing Machine—Floor.
American Scrubbing Mch. Co.

Scrubbing and Washing Powders.
India Alkali Works.
Mathieson Alkali Works.
Warren Soap Mfg. Co.

Second Hand Machinery and Supplies.
Bryan Electric Co.
Chipman Knitting Mills.
Nashville Industrial Corp
Textile Service & Equip. Co.
Toomey, Frank, Inc.
Walraven Co.

Second Hand Machinery Wanted.
Textile Service & Equip. Co.

Sewing Machines.
Merrow Machine Co., The.
Textile Finishing Machinery Co

Shades—Electric Lamp.
(See Reflectors).

Shafting and Hangers.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Link-Belt Co.
Skayef Ball Bearing Co.
Walraven Co., The.
Wood's Sons Co., T. B.

Shears.
Roy & Sons Co., B. S.

Shelving—Sectional Steel.
Collins, J. D.
Hyatt Roller Bearing Co.
Lupton's Sons Co., David.
Sanymetal Products Co.
Vonnegut Hardware Co.

Shingles—Asphalt.
Barrett Co.

Shingles—Metal.
Cortright Metal Roofing Co.

Shingles—Wood.
Southern Cypress Mfg. Asso.

Shipping Room Machinery and Supplies.
Atlanta Stamp & Stencil Works.
Bradley Mfg. Co., A. J.
Collins, J. D.
Diamond State Fibre Co.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lane & Bro., W. T.
Lewis Co., G. B.
Standard Fibre Co.
Walraven Co., The.
Walke Box Co., Inc.

Shower Baths and Cabinets.
Crane Co.
Sanymetal Product sCo.

Shuttles.
Crompton & Knowles Loom Wks.
Draper Corporation.
Shambow Shuttle Co.
Southern Bending Co.
Walraven Co.

Sick Room Supplies.
Estes Surgical Supply Co.
Perryman-Burson Co.

Singeing Machinery.
Butterworth & Sons Co., H. W.
Phila. Drying Machine Co.
Textile Finishing Machinery Co., The.

Siren.
Brown Co., A. & F.

Sites for Factories. (See Industrial Sites.

Size Box Temperature Controller.
Powers Regulator Co.

Size Kettles.
Butterworth & Sons Co., H. W.
Hauser-Stander Tank Co.
Howard & Bullough, American Machine Co.
Lombard Iron Works & Sup. Co.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

Sizing and Finishing Compounds.
(See Finishing and Sizing Materials).

Skewers.
Jordan Mfg. Co.

Skylights—
Drouve Co., G.
Lupton's Sons Co., David.

Slag for Concrete.
Birmingham Slag Co.

Slashers and Slasher Room Supplies.
Butterworth & Sons Co., H. W.
Cocker Mch. & Foundry Co.
Howard & Bullough.
Pickens Slasher Hood Co., R. O.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

Slasher Cloth.
Philadelphia Felt Co.

Slasher Tape.
(See Tape—Slasher).

Slate Asphalt Roofing.
Barrett Co.

Sliding Partition Hardware.
Richards-Wilcox Mfg. Co.
Sanymetal Product sCo.
Vonnegut Hardware Co.

Slubbers.
Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

Soap—Textile.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Electric Smelting & Aluminum Co.
India Alkali Co.
Kali Mfg. Co.
Klipstein & Co., A.
Mathieson Alkali Works, Inc.
Newport Chemical Works.
Sonneborn Sons, Inc., L.
Stearns, Wm. Taylor.
United Chemical Products Corp.
Warren Soap & Mfg. Co.
Wolf & Co., Jacques.

Soda (Textile, Soda Ash and Boiling.)
Klipstein & Co., A.
Mathieson Alkali Works, Inc.
Sonneborn Sons, Inc., L.

Softeners—Cotton.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Ford Co., J. B.
Grasselli Chemical Co.
Kali Mfg. Co.
Klipstein & Co., A.
Mathieson Alkali Works, Inc.
Moore Oil Refining Co.
Newport Chemical Works.
Roessler & Hasslacher Chemical Co.
Sonneborn Sons, Inc., L.
United Chemical Products Corp.
Wolf & Co., Jacques.

Softeners—Water.
(See Water Softeners).

Solderless Connectors—Frankel.
Westinghouse Elec. & Mfg. Co.

Solvents.
(See Finishing).

Speedometers.
(See Counters.)

Spindles.
Draper Corporation.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Vermont Spool & Bobbin Co.
Whitin Machine Works.

Spinners.
Amer. Yarn & Processing Co.
Amoskeag Mfg. Co.
Arkray Mills, Inc.
Arlington Cotton Mills.
Arrow Mills, Inc.
Boger & Crawford.
Flint Mfg. Co.
Fletcher Works.
Florsheim, H. A.
Gray Mfg. Co.
Hunter Mfg. & Commn. Co.
Myrtle Mills, Inc.
Pacific Mills
Philadelphia Felt Co.
Parkdale Mills, Inc.
Wellington, Sears & Co.

Spinning Frames.
American Machine Co., H. & B.
Crompton & Knowles Loom Wks.
Hopeda'e Mfg. Co.
Howard & Bullough.
Schaum & Uhlinger.
Saco-Lowell Shops.
Whitin Machine Works.

Spinning Rings.
Draper Corporation.
Howard & Bullough.
Greist Mfg. Co.
Whitin Machine Works.
Whitinsville Spinning Ring Co.

Spinning Tape Specialists.
American Textile Banding Co., Inc.
Barber Mfg. Co.

Spooling Machinery.
Draper Corporation.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Whitin Machine Works.

Spooler Tensioning Device.
Textile Specialty Co.

Spools and Skewers.
Lestershire Spool & Mfg. Co.
Mossberg Pressed Steel Corp'n.
Shambow Shuttle Co.
Vermont Spool & Bobbin Co.
Walraven Co.

Sprinkler Tanks.
(See Tanks, Towers, Etc.).

Sprockets.
Link-Belt Company.
Morse Chain Co.

Spur Cap Shells.
Gallaudet Aircraft Corp.

Stamps, Stencils and Stencil Machines.
Atlanta Stamp & Stencil Works.
Bradley Mfg. Co., A. J.

Stand Pipes.
(See Tanks, Towers, Etc.)

Starch and Gums.
(See Finishing and Sizing Materials).

Steam Engines.
(See Engines—Steam).

Steam Hose.
(See Hose—Fire.)

Steam Pumps.
(See Pumps—Steam).

Steam Traps.
(See Traps—Steam).

Steel Shelving, Doors, Window Partition, Etc.)
Collins, J. D.
Lupton's Sons Co., David.
Sanymetal Products Co.

Stencils and Stencil Papers.
(See Stamps and Stencils).

Stencil Brushes.
(See Marking Pots and Brushes).

Stencil Cutting Machines.
Atlanta Stamp & Stencil Works.
Bradley Mfg. Co., A. J.

Sticks (Picker).
See Picker Sticks.

Stop Motion.
Crompton & Knowles Loom Wks.
Draper Corporation.
Eclipse Textile Devices, Inc.
Textile Specialty Co.
Whitin Mch. Wks.
Wildman Mfg. Co.

Stokers.
Westinghouse Elec. & Mfg. Co.
inals.

Storage Racks.
(See Shelving).

Straps—Lug.
Garland Mfg. Co.

Strapping.
(See Leather Specialties or Band Strapping).

Street Lighting Fixtures.
Cutter Works, George.

Supplies—General Mill.
Brown, A. & F.
Howard Bros. Mfg. Co.
Nashville Industrial Corp.
Slaughter Machinery Co., G. G.
Steel Heddle Mfg. Co
Textile Service & Equip. Co.
Vermont Spool & Bobbin Co.
Walraven Co., The.

Surgical Supplies.
Estes Surgical Supply Co.
Perryman-Burson Co.

Switches—Knife-Elec.
Cutter Works, George.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Switchboards—Panel.
Cutter Co., George.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Tables, Chairs, Etc.
Manufacturing Equipment & Engineering Co.

Tallow.
(See Finishing Materials).

Tanks and Tubs.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
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Permutit Co.
Phila. Drying Machinery Co
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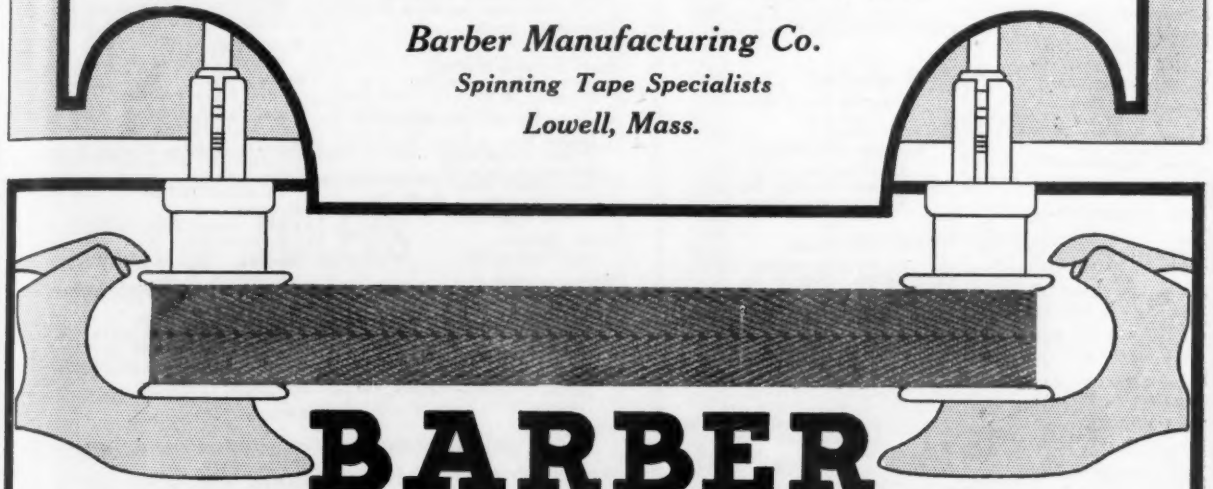

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Tape Looms—Cotton.
Fletcher Works.
Schaum & Uhlinger.

Tapes—Spinning and Twisting.
Barber Mfg. Co.

Tape Making Machines.
(See Bandage and Tape Mach.)

Telephones—Calling System.
Bryan Electric Co.
Carter Electric Co.
General Electric Co.

Temperature Controllers.
Carrier Eng. Corp.
Foxboro Co., Inc.
General Electric Co.
Parks-Cramer Co.
Powers Regulator Co.

Temples.
Draper Corporation.

Tenters.
Butterworth & Sons Co., The.
Textile Finishing Mach. Co.

Tenter Frame Guider (Electric).
Blake Electric Mfg. Co.

Tension Service for Spoolers.
Textile Specialty Co.

Tensioner (Warp.)
Warp Compressing Mch. Co.

Textile Machinery.
(See Cotton Mill Machinery).

Thermometers
Foxboro Co.

Thermostats.
Foxboro Co.
Powers Regulator Co.

Theatre Equipment.
Southern Theatre Equipment Co.

Thin Place Preventers.
Draper Corporation.

Thread Guides.
Foster Machine Co.
Palmer Co., The I. E
Textile Specialty Co.

Time Clocks.
(See Clocks.)

Tiering Machines.
Collins, J. D.

Ties—Baling.
(See Bale Ties).

Toilets.
Crane Co.
Manufacturing Equipment & Engineering Co.
Rundle-Spence Mfg. Co.
Vogel Co., Jos. A.

Toilet Partitions.
Lupton's Sons Co., David.
Sanymetal Products Co.

Tool Cabinets—Steel.
Lupton's Sons Co., David

Tool Stands—Steel.
Lupton's Sons Co., David

Tools—All Kinds.
Walraven Co., The.

Top Flats Reclothed.
Howard Bros. Mfg. Co.

Towers.
(See Tanks and Towers).

Tractors—Electric, Industrial.
Collins, J. D.

Transmission—Power.
(See Power Transmission Machinery).

Traps—Return Steam.
Morehead Mfg. Co.

Trucks—Auto.
White Co.

Trucks, Baskets, Etc., (Mill.)
Lane & Bros., W. T.
Lewis Co., G. B.

Trucks—Electric—Inter.
Collins, J. D.

Trucks—Hand and Elevating.
Collins, J. D.

Trucks—Inter, Etc.
Diamond State Fibre Co.
Lewis Co., G. B.
Standard Fibre Co.

Trusses and Abdominal Belts.
Estes Surgical Supply Co.
Perryman-Burson Co.

Tubes—Cloth.
Diamond State Fibre Co.

Turbines (Hydraulic).
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Turbines—Steam.
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Twisting Machinery and Supplies.
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Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Whitin Machine Works.

Underground Piping
Fire Protection & Const. Co.

Urinals.
Crane Co.
Rundle-Spence Mfg. Co.
Vogel Co., Jos. A.

Unions—Bronze.
Crane Co.
Lunkenheimer Co.

Vacuum Pans.
Cresson-Morris Co.

Valves—Angle, Globe, Cross, Blow-off, Check, Gate, Pop-Safety, etc.).
Crane Co.
Lunkenheimer Co.
Walraven Co.

Valves (Foot).
Brown & Co., A. & F.

Valves—Non-return Stop.
Crane Co.
Lunkenheimer Co.
Walraven Co.

Varnishes.
American Roofing & Paint Co.
Barrett Co.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co., Inc.

Vats.
(See Tanks.)

Ventilating Apparatus.
Bayley Mfg. Co.
Carlisle & Gale Co.
Carrier Eng. Corp.
Drouve Co. G.
General Electric Co.
Parks-Cramer Co.
Sargent's Sons Co., C. G.
Tolhurst Machine Co.

Vises and Benches.
Richards-Wilcox Mfg. Co.

Village Architects and Designers.
Lockwood, Green & Co.
Robert & Co.
Sirrine, J. E.
Spiker & Lese.

Village Houses.
(See Houses—Ready-Built).

Wagon and Car Unloaders.
Curtis Pneumatic Mchry. Co.

Wall Board.
Cornell Wood Products Co.

Warehouse—Portable.
(See Buildings).

Warehouse Door Hardware.
(See Doors and Hardware).

Warp Compressing Machines
Warp Compressing Mch. Co.

Warehouse Trucks.
(See Trucks.)

Warp Drawing Machine.
Cocker Machine & Fdry. Co.
Crompton & Knowles Loom Wks.

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Cocker Mch. & Fdry. Co.
Draper Corporation.
Howard & Bullough.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Warp Compressing Mch. Co.

Wash Basins.
(See Lavatories).

Washers—Cloth.
American Laundry Machinery Co.
Butterworth & Sons Co., H. W.
Cocker Mch. & Fdry. Co.
Klauder-Weldon Dyeing Mch. Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Mchry. Co.
Tolhurst Mch. Wks.

Washers.
Diamond State Fibre Co.

Washing Powders (Floor).
India Alkali Works.

Waste Bins—Steel.
Lupton's Sons Co., David.

Waste Machinery—Cotton.
Howard & Bullough.
Saco-Lowell Shops.
Sargent's Sons Corp., C. G.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Co.

Watchman Clocks.
(See Clocks—Watchman).

Water Coolers—Fountain.
Crane Co.
Manufacturing Equipment & Engineering Co.
Miles Refrigerating Co.
Puro Sanitary Drinking Fountain Co.
Rundle-Spence Mfg. Co.
Southern Ice Machine Co.
Taylor, Halsey W.
Twentieth Century Brass Works.

Water Columns.
Lunkenheimer Co.

Water Softeners & Purifiers.
American Water Softener Co.
Norwood Engineering Co.
Permutit Co.
Scaife & Sons Co., Wm. B.

Water Supply System.
Sydnor Pump & Well Co., Inc

Water Towers.
(See Tanks and Towers).

Waterproofing Machinery.
Butterworth & Sons Co., H. W.
Textile Finishing Machinery Co., The.

Weaving.
(See Yarn Manufacturers).

Welding Apparatus—Electric Arc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Welding Apparatus and Supplies—Oxy-Acetylene.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

Welding—Job.
Standard Gas Products Co.

Welfare Architects.
(See Village Architects).

Welfare Equipment.
American Laundry Mchry. Co.
Cable Piano Co.
Cornell Wood Products Co.
Crane Co.
Cutter Works, George.
Estes Surgical Supply Co.
Manufacturing Equipment & Engineering Co.
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(See Fibre Products).

Wheel Puller.
General Electric Co.

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Crane Co.
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Whizzers.
East Jersey Pipe Co.
Tolhurst Mch. Wks.

Winders.
Firsching, J. A.
Howard & Bullough, American Machine Co.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Universal Winding Co.

Window Frames & Sash—Steel.
Drouve Co. G
Lupton's Sons Co., David

Window Sash—Steel.
Drouve Co., G.
Lupton's Sons Co., David.

Wires—Drop.
(See Drop Wires).

Wiring Conduits and Fittings.
(See Electric Mchy. & Supplies.)

Wiring—Elecrical.
(See Electrical Contractors)

Wood.
(See Lumber).

Wood Board Panels for Walls & Ceilings.
Cornel Wood Products Co.

Wood Boxes.
(See Packing Cases.)

Wood Preserver.
American Roofing & Paint Co.
American Cement Paint Co.
Barrett Co.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Niles Co., Wm. J.
Wadsworth, Howland & Co., Inc.

Wood Pulleys.
(See Pulleys).

Woodworkers' Benches and Vises.
Richards-Wilcox Mfg. Co.

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Butterworth & Sons Co., H. W.
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Schofield Co., Wm.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Sargent's Sons Corp., C. G.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co.
Whitin Machine Works.

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American Yarn & Processing Co.
Amoskeag Mfg. Co
Arkray Mills, Inc.
Arlington Cotton Mills.
Arrow Mills, Inc.
Boger & Crawford.
Dixie Mercerizing Co.
Flint Mfg. Co.
Florsheim, H. A.
Gray Mfg. Co.
Hunter Mfg. & Comm. Co.
Pacific Mills.
Myrtle Mills, Inc.
Parkdale Mills, Inc.
Philadelphia Felt Co.
Weimar Bros.
Wellington, Sears Co.

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(See Cotton Yarn and Cloth Commission Merchants and Dealers).

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(See Dyers).

Yarn Testers.
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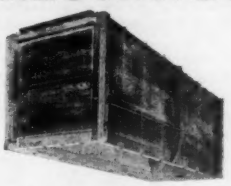

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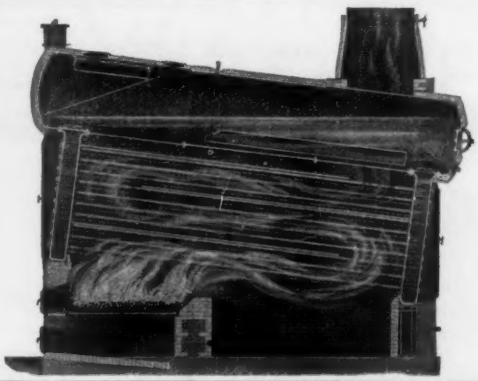

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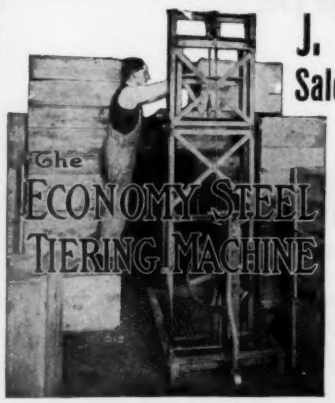

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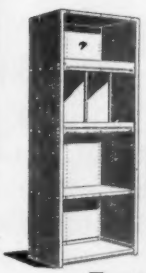

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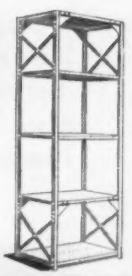

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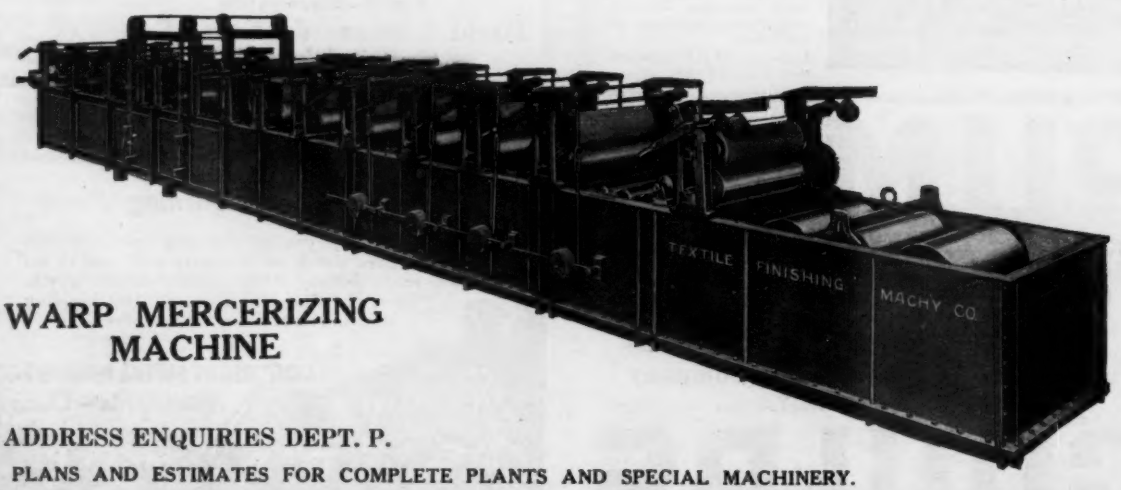

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